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Memorandum

U.S. Department of Transportation
National Highway Traffic Safety Administration

DEPT. OF TRANSPORTATION

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NHTSA-99-5218-3

Subject: Submittal of Meeting Minutes of the **MVSRAC/Event** Data Recorder **(EDR)** Working Croup to Docket No. NHTSA-99-5218

Date: OCT 12 1999

From: Raymond P. Owings, Ph.D. Associate Administrator for Research and Development

Reply to Attn. of **NRD-01**

To: The Docket

THRU: Frank Seales, Jr.
Chief Counsel

Attached are the meeting minutes of the Motor Vehicle Safety Research Advisory Committee, Crashworthiness Subcommittee, Event Data Recorder **(EDR)** Working Croup meeting held on June 9, 1999.

Meeting history:

Meeting #	DATE
1	October 2, 1998
2	February 17, 1999
3	June 9. 1999

This working group is related to the following dockets:

NHTSA-98-3887: Crashworthiness **Subcommitte**
NHTSA-98-3928: MVSRAC Full Committee

Research and Development requests that the minutes of this meeting be placed in the public docket.

Attachments

#

Get it together!
SAFETY BELTS SAVE LIVES

Motor Vehicle Safety Research Advisory Committee

Crashworthiness Subcommittee
Event Data Recorder Working Group
Meeting #3

Final Minutes
Wednesday, June 9, 1999
9:00 AM - 4:00 PM
NHTSA Headquarters
Washington, DC

The Event Data Recorder (EDR) Working Group consists of a panel of government and industry officials appointed by the Motor Vehicle Safety Research Advisory Committee's (MVSRAC) Crashworthiness Subcommittee. The third meeting of the EDR Working Group members and invited guests was held at the National Highway Traffic Safety Administration's (NHTSA) headquarters in Washington, DC. The purpose of the meeting was to: 1) continue to work on the working group's objectives, 2) review working group member's inputs for data elements, 3) continue discussion of privacy and legal issues related to EDRs, and 4) continue to expand the working group's knowledge through several presentations. The meeting was co-chaired by John Hinch and Dave Bauch. The agenda for the meeting is included as **Attachment 1**.

1.0 Welcome, Introduction, Meeting Objectives, and Approval of Previous Meeting Minutes

The meeting was called to order by John Hinch, who welcomed everyone to the meeting. Dave Bauch was recognized as the meeting co-chair. Dr. Joseph Kanianthra, Chairman of the Crashworthiness Subcommittee of the MVSRAC, welcomed the members and guests of the working group and gave some details on the operation of a working group within the MVSRAC. Dr. Kanianthra told the group that he was very excited with the progress of the group, and that the EDR group was one of the most active working groups within MVSRAC.

The minutes from the February 17, 1999, meeting were approved by the working group. General Motors submitted a new position paper on data ownership. This replaced attachment 7 in the draft minutes. Additionally there were several minor typographical corrections reflected in the final minutes. The approved minutes and attachments for the February meeting were placed in the DMS in early July, 1999. You can review this information using the DMS, as follows:

➔Internet address: http://dms.dot.gov/
➔click on "Search" about ½ way down the page
➔click on "Docket Search Form"
➔fill in the docket ID with "5218"
➔select "NHTSA" for the agency
➔select "1999" for the CY
➔press search.

2.0 Objectives

John Hinch led a discussion on the objectives of the WG. First he reviewed all the objectives and solicited input from the WG for changes or new objectives. The following is the current list of objectives for the WG

1. *What is the status of EDR technology?*
2. *What data should be selected for recording?*
3. *How should the data be collected & stored?*
4. *How should the data be retrieved?*
5. *Who should be responsible for keeping the permanent record?*
6. *Who owns the data?*
7. *Who are the customers for EDR data?*
8. *Demonstration of EDR technology.*

After the review, there were several detailed discussions, as follows:

Item 1 - EDR Status
✐ John Mackey will contact VDO about Europe operations.
✐ EDR status should include a census of all manufacturers. John Hinch agreed to talk to the two major Associations to see if they could assist the MVSRAC in this effort.
✐ May want to include the suppliers in this census.

Item 2 - Data
No discussion

Item 3 - Storage
✐ Manufacturers do not use a common format for storing data
✐ There is a possibility that in the long term, manufacturers could develop a common format, but regulatory activity may be required.
✐ May want to look at the EPA and/or CARB requirements to see if there are any guidelines for standardization of data storage format.
✐ There was a request to see if we could get a presentation from EPA on OBD2 technology. John Hinch will check into this request.
✐ There was a question to the group for consideration on what should trigger an EDR. Currently, OEM systems use trigger logic associated with the air bag deployment system.

Item 4 - Retrieval
✐ There was a request that we try to get Vetronix to come to a meeting in the future to discuss data retrieval.
✐ There was a comment associated with the need for retrieval in the future when EDR data could be transmitted from the vehicle to a central file.
✐ Additional comment was made that this is already being done in some commercial non-OEM installations.

Item 5 - Permanent Record
No discussion

Item 8 - Demonstrations
✐ John Mackey submitted a description of an aftermarket system in response to Item 8. A copy is included in **Attachment 2.**

It was decided to have breakout sessions at the next meeting to concentrate on Items 2, 6, & 7 This ended the discussion of the objectives.

3.0 Discussion of EDR Data Elements

John Hinch led a discussion on selection of data elements for inclusion in an EDR system

Joe Marsh made a presentation on a selection procedure he had developed which would help the WG analyze the various inputs on the data. Kathy Gravino agreed to help with this effort. A copy of Joe's proposal is found in **Attachment 3**, along with additional inputs from Tom Kowalick on setting priorities.

Dave Bauch made a presentation on Ford systems. He discussed the police fleet EDR study and the current OEM system Ford is installing on some of their models.

Several new Data Forms were submitted for consideration. They are found in **Attachment 4**

LUNCH BREAK

4.0 Presentations

Art Carter, NHTSA, made a presentation on the Agency's activities associated with Automatic Collision Notification. A copy of Art's presentation is found in **Attachment 5.**

Joe Marsh made a presentation on recent activities he had learned about through an ISO meeting. A copy of the presentation is found in **Attachment 6.**

Vern Roberts discussed the recent NTSB symposium on Recorders. A copy of the pre-event proceedings was handed out to each member of the WG.

John Hinch and Joe Marsh passed out a set of Press clips related to EDRs. A set is found in **Attachment 7.**

5.0 Discussion of Privacy Issues:
Sharon Vaughn, NHTSA, led a discussion on data privacy and related legal issues. The discussion started with a review of NHTSA's position on data ownership and a presentation on data ownership by VW. The VW paper is found in **Attachment 8.**

There were some discussions related to insurance company access to EDR data. John Mackey and Sharon Vaughn agreed to put together a paper on this subject.

There was a comment that ITS had a position on privacy issues. I have contacted ITS and asked for its policy in this area. I will share this with the WG at the October meeting.

There was a request for a copy of NHTSA Crash Investigation release form. I discussed this with the Special Crash Investigation (SCI) staff and found that they obtain verbal permission to inspect the vehicle and take measurements. They obtain written permission to obtain medical records. A copy of the medical release is found in **Attachment 9.**

6.0 Working Group Activities

6.1 Member list and Attendee list: It was learned that two members have left the working group - Ray Peck from the California State Government and Ken Opiela from the Transportation Research Board, National Research Council. A copy of the current WG member list and June meeting attendee list is found in **Attachment 10.**

6.2 Meeting Co-Chair for next meeting: Sharon Vaughn

6.3 Next Meeting: October 6, 1999, Washington, DC

6.4 The following topics were presented for discussion at the next meeting:

- a. Three Breakout sessions:
  1. What data should be selected for recording?
  2. Who owns the data?
  3. Who are the customers for EDR data?
- b. Discussion of Insurance company legal issues
- c. Potential Presentations for Next Meeting
  1. Ford Racing
  2. VDO
  3. Sophia Rayner EDR system
  4. Vetronix

6.5 Work assignments/action items

6.5.1 Data Elements

Joe Marsh, Ford and Kathy Gravino, DaimlerChrysler agreed to develop a new data form based on discussions at the June Meeting. They will provide the form in electronic format to NHTSA who will circulate it to the working group members. The Members agreed to fill out the new form prior to the October meeting.

6.5.2 Ownership/Privacy

Sharon Vaughn, NHTSA and John Mackey, Loss agreed to put together a white paper on the role that insurance companies play in the legal issues associated to data ownership. They will present this paper at the October meeting.

6.5.3 The WG agreed to hold three breakout sessions at the October meeting. These will work on Objectives 2, 6, & 7. Each member will need to select which area they are interested in participating. Each member and guest should decide which area they want to work on prior to the meeting so we do not loose meeting time trying to divide in these groups.

6.6 New Business

6.6.1 John Hinch indicated he would be participating in a TRB A2A04 summer workshop. One of the activities for the workshop will be EDRs. John asked for input from the WG for presenting to the A2A04 members, which tend to be state, local and federal highway transportation officials.

6.6.2 Doug Gurin indicated that his office would be holding some workshops on research. Although the strategic planning workshops to establish research priorities for technology applications on behalf of traffic safety programs has not yet been scheduled, interested parties should contact Doug at 202 366 5594 for information.

6.6.3 John Hinch passed out a *Federal Register* notice which detailed recent NHTSA action denying a petition requesting the agency to require EDR technology on new motor vehicles. A copy is found in **Attachment 9.**

Attachments

1 Agenda
2 Loss Management Services, Inc. write up for Objective #8
3 Data Structure inputs:
  - Revised data element structure proposed by Ford
  - Classification methodology proposed by Tom Kowalick, John Carney, Jeya Padmanaban, and Greg Shaw
4 Data Forms
  - John Carney,
  - DaimlerChrysler
  - FHWA
  - Loss Management Services, Inc.
  - Transport Canada, Collision Avoidance
  - Transport Canada, Collision Investigation
  - Transport Canada, Ergonomics
5 ACN Presentation
6 Japan Drive Recorder Committee presentation
7 Press clips and news stories on EDR
8 VW "White Paper" on privacy
9 Misc.
  - NHTSA crash investigation medical release form
  - Federal Register Notice
10 Attendance list and Updated Working Group Member list

AGENDA

Event Data Recorder Meeting #3

9:oo am - 4:00 p.m. Wednesday, June 9, 1999

Room 6200-04 NASSIF Building; 400 7th Street S. W.; Washington DC 20590

Working Group Objective
Facilitate the collection & utilization of collision avoidance and crashworthiness data from on-board EDRs.

Meeting Objective
Third meeting objectives: 1) Working Group Objective; 2) Review WG members' input for data elements; 3) Review of WG's privacy issue white papers; 4) Other systems & data

9:00 Welcome and Introductions (John Hinch) Hello from Joe Kanianthra 9:15 Review and Approval of February 17, 1999, Meeting Minutes (John Hinch) -GM Change 9:30 Working Group Objectives (John Hinch) Review of last meeting outcomes Sign-up for work on Objectives 10:15 Break 10:30 Discussion of EDR Data Elements (John Hinch) -Review of Individual WG member Inputs -Refinement of "Top Ten" list -Summation of Results 11:30 Use of Data for Advanced Design (Dave Bauch) 12:00 Lunch 1:00 Automatic Collision Notification (ACN) Presentation (Art Carter) 1:45 Discussion on Privacy Issues (Sharon Vaughn) -Presentation of additional White Papers (10 min each max) -Summation of Major Ideas (WG)	2:40 Break 2:50 Small Manufacturer Concerns (ideas for next meeting) 3:00 Discussion of MVSRAC Meeting & EDR WG Presentation (John Hinch) 3:15 Review of NTSB Symposium on Recorders (Vem Roberts) News articles 3:30 Committee Work -New Business -NCHRP Summer Meeting Activities related to EDR (John Hinch) -Next Meeting -Objectives -Presentations -Date -Co-Chair for next meeting -Breakout sessions Working Group Material For Review Books on EDRs For Handout NTSB Draft Proceeding of Symposium

June 9, 1999

NHTSA EDR Working Group, Washington, D.C.

Loss Management Services, Inc.
John J. Mackey & Tony Reynolds (VDO North America)

WORK ASSIGNMENTS FOR OBJECTIVES 1, 2, 3, 4, 7 & *8
(a collective response)

* # 8 Mobile Accident Camera (MAC)box "proof of concept" demonstration

Digital Eye- Witness Systems

Loss Management Services, Inc., 36 Surf Road, Lindenhurst, NY 11757

HIGHWAY MOBILE ACCIDENT CAMERA

According to the National Center for Health Statistics, "National Health Survey", in 1996 there were 35 million motor vehicle accidents with an associated total economic loss of $120.8b. Approximately 60% of the $120.8b was spent on claims payment and an additional 12% in legal fees. What is not known is how much of this amount was spent settling or defending fraudulent and frivolous claims. However, Loss Management Services, Inc. (LMS) does have a way to control these costs. LMS has developed systems to control claims pay out and litigation costs while deterring fraudulent and frivolous claims, along with providing for a real crash data bank for regulatory agencies.

LMS has developed the MAC (Mobile Accident Camera) Box system which will record the events leading up to an accident, capture accident data and record the aftermath. The MACbox will provide a "driver's eye view" of the entire incident from beginning to end. The only difference is that the MACbox will disclose without bias, the event as it occurred. The system is an application of existing commercial technology answering the most common and most vexing mystery: Whose fault was it? And, what happened? By working closely with our client companies, the insurance industry and our technology partners we will also establish a rich repository of information that will be used to help mediate claims, assign responsibility, advance vehicle safety and reduce the total economic loss that results from motor vehicle accidents.

The MACbox acts as a 'Digital Eye-Witness' to the occurrence of a crash and removes any doubt as to which driver is at fault. This information will allow the insurers to immediately evaluate their exposure and decide whether settlement of the claim is in order. The impact of clearly establishing fault via video recording of the accident will drive the insurance companies to participate in this program. As there recently exists a type of **basic** Event Data Recorder (EDR) box within the GM higher valued end vehicles, the MACbox system affords much more data useful in determining and accurately assessing liability along with frivolous and fraudulent type insurance claims.
what is needed within the EDR environment.

The MAC Box system will be capable of providing benefit to the entire 200 million plus vehicles on the U.S. roads today. Unfortunately, like seat belts and anti-lock brakes, this system will take time to gain acceptance. Part of the problem is that the world does not change quickly and the insurance industry needs to accumulate actuarial data before they can offer financial incentives to change. Based on our research, the initial market will be the "Self- Insured Retention" (SIR) type risks and high end valued private passenger vehicles. Among state and local governments, private fleets and the high valued end vehicles, it represents a market of close to 100 million vehicles. With two years of data and some direct involvement with selected insurance industry partners, we believe that we can establish the statistical and business basis for these insurance companies to offer incentives to their clients that purchase our product, not to mention the immediate benefits with the commercial fleet exposures.

We have been in contact with the National Highway Traffic Safety Administration and they have formed a committee with representatives from the major automotive manufacturers, the insurance industry, universities and medicine to develop a standard for a less aggressive product that will only capture motion information and contact the emergency services. The NHTSA has expressed a strong desire to have us present our solution to this august body. Most recently, we had the opportunity to do so at NHTSA's EDR Working Group. LMS is now apart of that group and is currently involved with identifying issues to make clear what will be appropriate in the commercialization of EDR.

Future versions of our product will have added functionality and reduced unit costs expanding coverage to the total motor vehicle market. We envision a MACbox fitting in the rear view mirror of every automobile and providing the ability to not only see and record accidents, but to contact police and pass important medical information to emergency medical technicians that are responding to the call. Additionally, the real world accident data gathered will be of great value to both the Federal Government, local law enforcement and car manufacturers in improving vehicle safety systems, along with an accurate assessment of highway infrastructure conditions. The foundation has been laid for making this vision a reality. A prototype is complete. LMS has entered into marketing, manufacturing, and technology partnerships with industry leaders to ensure that there will a 'best of breed' in developing the system for commercialization.

The Market

LMS will direct market the MACbox to insurance companies, long and short haul trucking companies, charter bus companies, car and truck rental companies, corporate fleet and limousine companies, along with municipal transit authorities and taxi and limousine exposures. According to the 1996 FARS/GES published Report, the number of vehicles in operation at that time was:

124.6 million Passenger cars
65.4 million light trucks (includes vans and utility vehicles)
7.4 million large trucks

The vehicle base is growing at a rate of 2% plus annually.

The initial target market will be both high-end valued vehicles and commercial fleet-type vehicles. The estimate of this market alone is nearly 100 million vehicles. With the second phase of the product, we will have a cost-effective solution for the private passenger vehicles. This will expand the market to the total population of vehicles in operation.

insurance Companies
LMS will develop strategic alliances with the top insurance carriers in the United States. The purpose of the alliances will be to develop a database of information regarding claim cost reduction and its relation to premium discounts. To date, discussions have begun with Allstate, Geico, State Farm, Liberty Mutual.

Market Segmentation Focus:

Private Passenger Transportation - Vehicles (PPT)
The MACbox provides a unique method of reducing accident claim expenses incurred by insurers. A 1996 report by the Insurance Information Institute stated that the entire vehicular insurance market incurred $120.8 billion in losses during 1996. According to their data bank 6,115,000 private passenger motor vehicle (PPV) accidents were reported nationwide in 1996. This equates to $77.7 billion dollars in losses for the PPV's alone. These costs represent the total claim expense and settlement costs absorbed by PPV insurance companies. These costs could be drastically reduced if the extent of litigation

Charter Bus Companies
Charter bus companies such as Laidlaw/Greyhound represent a significant potential market for LMS. These companies provide much of their own liability protection with SIR, and have tremendous potential exposure for personal injury claims. These operators are looking for proactive technology solutions to limit their roadway exposure. LMS plans to modify the MACbox to record accident information within the bus to help determine personal injury exposure.

Long and Short Haul Trucking
Long and short haul trucking companies often provide a portion of their liability protection through Self-Insured Retention (SIR). Within the SIR marketplace, the insured typically assumes liability up to a predetermined limit. In the case of long haul truckers this may be the first $500,000 per occurrence. It is in their best interest to limit their exposure to long and costly claims management and potential litigation. With the MACbox, those companies would have an expert witness with each of their vehicles. In the event of an accident, the information provided could be used to help limit the overall expense involved with the claim, along with providing for future safer routes.

Private Passenger Transportation (PPT) Rental and Truck Rental Companies
These companies represent a tremendous opportunity for LMS. The likelihood of having a driver involved in an accident return to testify during litigation is very low considering that most drivers are from out of state. This presents a very difficult situation for the legal departments of the rental companies. They are often presented with indefensible

claims and settle more claims than they would have to if they were to incorporate a MAC box in each vehicle.

Corporate fleet and Limousine Companies, Municipal Transportation Authorities and Taxi and Limousine Commissions

These potential customers represent a tremendous potential for LMS since they all involve operators for hire. The representative management involved with these risk exposures has a vested interest in maintaining the safety of the vehicles and their passengers. The ability to have an expert 'Digital Eye-Witness' available at the scene of every accident is an invaluable tool to these management teams. Both management and legal council will benefit from the information provided. They will be provided with information necessary to determine whether to litigate or settle as well as determine whether to terminate the employment of operators. LMS is presently in discussions with the New York City taxi & Limousine Commission.

Self Insured Retention (SIR)

Within the SIR market we have identified the following vehicular populations:
Long/Short Haul Trucking 800,000
Light Trucks 1,200,000
Buses (private charter/school) 500,000
Municipal (State & Local) 7,500,000
PPT (rental cars/fleet vehicles) 1,500,000
Taxies 3,500,000
Total 16,000,000

Personal Automobile consists of the majority of the transportation environment (124,600,000 vehicles – USA).

The MACbox system will be the much needed risk and insurance claim management tool for the transportation environment for the 21st Century.

Future Vision

Data Bank:

LMS will create and manage a database of image and crash data for use in determining roadway safety by Government agencies, Insurance Carriers and the Private Sector.

Civil Court Database:

LMS will provide for data transmission to the courts for automatic denial or a lack of causation of the Plaintiff regarding the liability portion of the action. That is, to determine, without jury selection, the validity of Plaintiff's case.

Trucker's Log:

The next generation of the MACbox will incorporate a "trucker's log" necessary in long haul trucking. The system will use accelerometer data to determine the movement and stationary positions of the truck. Trucker's logs are currently mandated by the Department of Transportation (DOT) and are used to determine a driver's activity.

Elevator MACbox:

Piloting commercial buildings with the MACbox within an elevator to capture sudden acceleration. The sudden drop or acceleration will cause the system to capture images within the elevator cab to determine the potential injury to any occupants. The Elevator MACbox can be used to indicate required maintenance.

Partners:

LMS has two partners that are currently committed to working on the development of the beta version of the first MACbox system. The parties and their component of the solution is as follows:

Phoenix Group Inc.	Specialized PC with Ruggidized enclosure and System Integration
VDO Kienzle North America	Shock and Motion Sensors and Trigger
ST Microsystems (Vision, Inc.)	Camera and Image Data Integration
S.A.I.C.	Telecommunication Operation
Forensic Accident Investigations	National Accident Reconstructionist Experts
LMS, Inc.	Marketing/Sales of MACbox & Image/Telemetry Repository Bank

Major Contacts

Targets for the Pilot Program

During our conversations with numerous organizations, some have expressed interest in being part of the initial 600 unit pilot program. They are:
Allstate Insurance
Avis Rental
UPS
New York City, NY MTA & Long Island, NY MTA
John Deere Insurance Services

Interested Entities

A key to the success of the MAC Box system will be the acceptance by the insurance industry. Our measure of their acceptance will be their premium discounts for the

installation of our product. While we are a couple years away from that level of acceptance, a number of insurance companies, transportation companies and agencies have expressed strong interest in working with us on this project. They are:
Allstate Insurance
John Deere Insurance Services
State Farm Insurance
Liberty Mutual Insurance Company
Office of Safety Performance Standards – NHTSA Research
NY MTA Buses – 4,900
NYC Taxi & Limousine Commission - 12,000 units
UPS - Fleet size - 164,000 units
AVIS Rental – 500,000
Enterprise Rental - 400,000
Greyhound/Laidlaw – 43,000
Northeast Trucking – 4,300

Current Service Offerings

LMS will offer a number of services that make use of the information developed by the MACbox or support the system. After we have developed the business with these foundation services we will expand the service offerings to include video recreations, expert witness testimony and arbitration services. As we move forward with the MACbox, the company is confident that we will find additional products and services that we can offer from the information that we collect.

Installation Services

LMS will offer our clients installation services with the new systems. Our organization will develop an installation process document that can be used by a local vendor to install the MACbox system into the vehicle and test the unit after installation. We intent to contract with electronic equipment installers that are local to our clients to make the process as convenient as possible for them. The initial installations will be performed under our supervision. The knowledge gained from these efforts will be incorporated into our process documentation. As part of the installation process, we will develop a remote certification procedure that will allow us to test the system prior to placing it into service.

Membership Fees

All users of the MACbox system will be charged an annual user fee. This fee will cover the maintenance of vehicle records containing, VIN number, owner, address and other user defined fields such as primary driver on our roster, quarterly remote testing of the MACbox to ensure that it is functioning properly and support from our help desk on the unit. The membership fees will be assessed per vehicle.

Accident Reports

LMS will provide accident reports for our clients. The information taken from the MAC box system will remain the property of LMS and users of that information will be required to purchase the information from us in the form of an "Accident Report". These reports will be available in both a hard copy format and an electronic format that will be accessible over a secure link to the Internet. The reports will be generated by LMS and moved from our internal repository to a customer repository that is managed using a sophisticated image and data management system. A security system will be used that ensures compliance with local, state and federal law related to defendant and plaintiff access to information. Billing for the reports accessed via the Internet will be automatic and clients will receive a monthly statement for usage. While the electronic access vehicle will be the most efficient way for our clients to receive accident information, certain clients may require hard copy. For those clients, a printed version of the report, including video images will be available. The accident report will contain all information from our data repository including vehicle information, time and date detail on the accident, the entire image file containing approximately 300 images and the motion data. The images will be taken at 10 frames per second for 15 seconds before and after the accident and the motion data will be saved for the same period of time. The motion information will track changes in velocity on two axes for the vehicle.

Future Services:

Video Accident Recreations:

Using a combination of the video images, motion information and computer based animation tools, LMS will be able to produce a video recreation of the accident from multiple angles. These recreations will incorporate the live video images where appropriate and augment the live video with animation to recreate the entire incident.

Expert Witness Services:

LMS will develop a network of "Expert Witnesses" from the ranks of educational institutions and industry that will be available for testimony in accident related cases. This network will span the country using individuals with the appropriate professional credentials to assist in explaining the physical characteristics of the accident and their professional opinion on the dynamics of the incident. LMS will contract with our clients for these services and retain the network of expert witnesses on our staff, as consultants that are compensated on an as needed basis.

Accident Arbitration Services:

LMS will offer arbitration services that will allow the parties involved in an accident a means outside of the court system to resolve accident related claims. Drawing on the information collected at the time the accident occurred, we will employ professional arbitrators to mediate cases using information taken from our repository.

The Products

'Product' Overview

With our partners, LMS is developing the Mobile Accident Camera (MAC) Box. LMS will provide these systems, which *Capture and Secure* 'driver's eye view' images and telemetry data prior to, during and immediately after an actual accident; *Manage* this data, including chain of custody; and *Distribute* the data, through the use of emerging digital and communications technologies.

By taking a component approach toward the development of the MACbox, LMS leverages the individual expertise of industry leaders to build a 'best of breed' solution. Partnered with Instrumented Sensor Technologies Inc. and Phoenix Group Inc. LMS will develop and manufacture the lowest cost, most reliable system for recording storing and transmitting accident data.

Within the MACbox resides a digital video camera as well as circuitry and software to:

- 'Sense' when an accident has occurred
- Capture video and telemetry data prior to, during and immediately after an accident
- Store and lock accident image and telemetry data after an accident
- Upload accident image and telemetry data to wireless networks
- Download accident image and telemetry data to a portable computer

The MACbox is made up of five functional components:
1) ST Microelectronics' Digital Video Camera utilizing a real-time software video compression engine - licensed through Phoenix Group, Inc. (www.ivpgi.com)
2) VDO Kienzle's biaxial accelerometer and 'trigger' system - developed by Instrumented Sensor Technology, Inc. (www.isthq.com)
3) Transceiver (vendors under evaluation)
4) CPU including system and flash memory as well as related interface circuitry for the other system components. The x86 CPU operating system is Windows CE. - System developed by Phoenix Group, Inc.
5) Power Supply and Battery Backup - developed by Phoenix Group, Inc.

Phoenix Group will provide the integration of all of the components with the digital video camera subsystem, CPU and power supply. PGI will be responsible for final assembly and testing.

Functional Overview

The MACbox continuously records: a) Video data in a software 'video loop' from the driver's point of view and b) Acceleration in two axis at a sampling rate of 2000 times per second. When an accident occurs, the VDO subsystem 'senses' that accident signature parameters have been matched or exceeded. This event 'triggers' the CPU to permanently store a video sequence which encompasses a definable period of time before and after the accident. The MACbox then transmits the video and accelerometer data that was acquired during and after the accident through the Motorola cellular transceiver. The MACbox then encrypts and 'locks' this data to prevent tampering.The result is a group of images and associated data transmitted by the MACbox, immediately after the accident has occurred, to a secure server.

The system allows a crash investigator, or other authorized party to see the crash develop before and after the impact from the driver's perspective. Accelerometer and video data are time-stamped to allow a complete re-creation of the crash. This data set will facilitate an accurate reconstruction of the crash.

The use of a personal computer based system will allow us to enhance the systems to include multiple cameras, driver monitoring and the other related features.

System Programmability

The system software embedded within the MACbox is programmable and can be tailored to the particular vehicle or application. System parameters including system thresholds and the number of images taken prior to, and immediately after, an accident can be altered to meet the requirements of a particular application.

***For** instance, if the default setting allows for the capture of images for **30** seconds prior to an accident and for an additional **30** seconds after the accident **but** then it is determined that it is advantageous to have more images before **the** accident than after, the system can **be** re-programmed to store **48** seconds worth of images prior to the accident and only **12 seconds** after.*

Engineering Requirements & Strategic Alliances

Phoenix Group, Inc.
(Contact: Richard Pandolfi, CEO @ 516-951-2700)

PGI. formed in 1994, is comprised of a cadre of highly skilled engineering and management personnel who have worked together for more than twenty years. Lead by Dick Pandolfi, this team built Miltope Corp. from a 1975 start-up into a 100 million dollar a year company. Under the auspices of Mr. Pandolfi, PGI is dedicated to the design and development of rugged, truly portable miniature computer systems.

The comprehensive PGI product line has been designed for demanding industrial and military field applications, where performance under harsh environmental conditions is essential. PGI products are ideally suited for vehicle, aircraft, shipboard and outdoor field applications.

PGI will design and manufacture a custom variation of one of their standard products to meet LMS's specifically defined criteria. PGI has years of experience integrating systems for end user application for their traditional customer base including OEMs (Original Equipment Manufacturers), VARs (Value Added Resellers) and Systems Integrators.

PGI's customers include Fortune 500 Companies, the U.S. Department of Defense as well as Foreign Ministries of Defense. PGI's Design capability coupled with its in-house automation offers LMS a source of quick prototyping and unique customizing skills. PGI's in-house integrated facility includes AutoCad supported by CAM, allowing quick and efficient conversion from design to final product. A modern, automated NC sheet metal and machining capability is combined with in-house mold making and injection molding capability. This will allow us to use the most cost effective and superior space age high strength carbon filled materials, pliable rubber and plastics in all LMS designs.

VDO Kienzle North America LLC
(Contact: Tony Reynolds, Product Manager @ 540-723-8015)

VDO North America is an industry leading high-technology instrumentation company focused on developing innovative products for vehicular transportation field measurement and data recording. The company specializes in development of physically compact, high performance digital data acquisition and recording systems for high-speed mechanical measurements.

VDO North America's mission is to provide high quality, high reliability data recording products and software at reasonable cost, and supported with high-level customer and applications support and service. The company's products are used widely in such applications as crash recording, transportation measurement and recording, automotive shock and vibration testing, vibration measurement, accident re-construction, and many others crash related measurements.

VDO North America offers a unique source of expertise and industry experience. They will design and manufacture a custom variation of one of their standard products to meet LMS's specifically defined criteria.

ST hficroelectronics (Vision, Inc.)
(Contact: Paul Gallagher @ 408-556-1553)

ST Microelectronics (Vision) is a company developing video systems for both retail and commercial markets. They have developed what we consider the most appropriate real-time video compression and resolution systems and related applications for Loss Management Services products.

Science Applications International Corporation (SAIC)
(Contact: Julius Nagy, Business Development Mgr. Automotive Technologies @ 248-263-3408)

SAIC is a leading telecommunications company that have agreed to supply their technological support for LMS, and assist in the up link of wireless image data transmission along with other existing telemetry data critical in the repository effort and service of LMS.

Forensic Accident Investigations, Inc.
(Contact: Robert C. McElroy, Ph.D. @ 561-995-6781)
FAI is a nationally renowned group of investigation experts that provide for accurate reconstruction of automobile and other ground transportation type crashes. FAI will provide LMS for expert reconstruction when warranted.

By leveraging the individual strengths of each partner, LMS will be able to offer its customers best-of-breed solutions at a competitive price. And the fact that each of these partners is a technology leader in their respective areas makes their support of the start-up company that much more significant.

Engineering

All existing system components were originally developed for the mobile computing/data recording market. For this reason, the completion of a prototype and ensuing production is less of a development process than a re-engineering and integration of components used in the Proof of Concept. The component suppliers are leading development, engineering and manufacturing firms in their particular markets. The greatest challenge is the re-engineering - for cost reduction and ease of integration - of LMS partner components and the development of the proper triggering thresholds.

Proof of Concept (began July 15, 1998; ended April 23, 1999)
Sept. 15, 1998 - Vision installs XX on PGI Nightingale
PGI interfaces VDO box

Oct. 1, 1998 - PGI interfaces Vision software and VDO UDS box
Dec. 7, 1998 - VDO tunes integrated system
April 24, 1999 - Product Demo Completed

Prototype Stage (began December 30, 1998; end April 30, 1999)

1) Requirement Analysis (began September 30, 1998; end October 30, 1998)

   b) Determine System Specifications

      i) Enclosure: ruggedized/environment/construction/X and Y-axis orientation/mounting

      ii) Camera (shock dampening, windshield mount, operational light level, resolution)

      iii) Cabling (connection specifications)

      iv) Upgradeability

      v) Extensibility

      vi) Real-time Operating System Requirements
         Startup requirements
         Shutdown requirements
         Diagnostics - remote monitoring, fault detection/prediction

      vii) XY Sensitivity
         trigger threshold waveform development

      viii) Video Memory:
         Resolution and 'frame-rate'
         X Seconds before
         Y Seconds after

      ix) Power supply requirements
         Main Power
         Battery Backup

2) Prototype development and testing (begin development March 15, 1999 - April 30, 1999)

   a) Re-engineering of system components

   b) Re-engineered system component integration

Beta Test Stage May 15, 1999 – August 30, 1999

600 Units placed in various vehicle types for data collection and testing. Buses, Trucks and Private Passenger Vehicles.

   a) Re-engineering of system components

   b) Re-engineered system component integration

First Revenue Ship November 1, 1999

By working closely with the transportation industry, insurance companies and our technology partners, we will establish a rich repository of information that will be used to help mediate insurance claims, insurance fraud, assign responsibility, advance vehicle safety and reduce the total economic loss that results from motor vehicle crashes. The System will finally answer the most vexing mystery: What happened? And, whose fault was it?

THE CONTRIBUTION OF ONBOARD RECORDING SYSTEMS TO ROAD SAFETY AND ACCIDENT ANALYSIS

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Fax: USA-540-662-2127

INTRODUCTION

This paper presents onboard computer systems (black boxes), that

1. contribute to road safety by helping to reduce the number of accidents
3. provide data for accident analysis based on field experiences in USA and Europe with case studies.

There are several versions of onboard computers that record the performance of drivers and vehicles. Field experiences and case studies show that a 'feed back' of these records lead to a favourable modification of drivers' behaviour. Further these objective and accurate recordings allow detailed reconstruction and analysis of accidents.

FREQUENCY. COST AND CAUSE OF ACCIDENTS

In the EU a total of 1.3 million road accidents with personal injury and 45.000 people killed were registered in 1995. The damage caused by these accidents has been estimated to reach as much as 45 billion ECU (about the same in US$).

It is worth noting that - in Germany for instance - 90% of the registered accidents are caused by human error. only ! 0% by technical defects. These figures show that urgent action is required mainly in the field of driving behaviour.

EXPERIENCES GAINED WITH ONBOARD COMPUTERS FOR ACCIDENT RECONSTRUCTION AND ACCIDENT ANALYSIS

Extensive experiences have been gained concerning the accident-preventing effect of onboard computers and their contribution to improved accident analysis. Let us mention the extraordinarily high contribution of the tachogaph to improve road safety in the commercial vehicle sector in the European Union. which led many other counties to also stipulate tachographs for the commercial transport of goods and passengers.

This paper describes the effect of two further onboard computers or black boxes. The first system is an onboard computer used in the first place to improve fleet management by recording such data as driving time, road speed. distance travelled, engine load etc. The second system is an Accident Data Recorder that has been developed to meet the specific requirements of accident analysis.

CASE STUDY FOR ACCIDENT PREVENTION BY A FLEET MANAGEMENT ONBOARD COMPUTER

Laidlaw Inc.. the largest contractor operator of school bus fleets in the United States fitted 50% of its Bridgeport fleet with onboard computers supplied by **VDO** North America. Based on **a 6** months test two bus groups (with and without onboard computer) were analysed with the following results:

Reduction of Accidents

Busses without VDO onboard computers accounted for 72% of accidents.

Bridgeport fleet would have suffered 62 accidents without the VDO onboard computers. The actual account was 43. Thus 19 accidents were prevented by the educative effect of the onboard computer.

Accident Data and Analysis Produce Legal Evidence

Data extracted from vehicles involved in accidents allow detailed reconstruction and analysis. Conflicting reports from eye-witnesses. drivers, and passengers can be reconciled. The hard facts facilitate investigations considerably. Providing indisposed data on accidents **can largely reduce the amount** of management and administrative time required for review etc.

Fleet Management Control Restored

The management is supplied with objective, accurate. minute-by-minute recordings of all drivers in monitored busses. Drivers with registered short- **comings** can be counselled. These corrective interviews are the tool in the 'feedback loop' to the required modifications of drivers' behaviour and to restore fleet management control.

Reduction of Liability and Maintenance Costs

By avoiding 19 accidents in the case study it could be estimated that 76.000 USS in body work expense was saved.

Case study: Laidlaw Inc.. Bridgeport. CT facility

1. Reduction ofaccidents
2. Accident data and analysis produce legal evidence
3. Fleet management control restored
4. Reduction of liability and maintenance costs

Figure 1: Accident prevention by a fleet management onboard computer

These results show that the investment is paid back twice. Firstly by reducing accidents with the involved human and social implications and costs and secondly, by the improvement **of** the fleet management.

THE ACCIDENT DATA RECORDER

The Accident Data Recorder was specifically developed for accident analysis but has also proven its accident preventive character in more than four years of field experience.

Technical Features of the Accident Data Recorder

Before discussing these two aspects, accident prevention and accident analysis, it will be useful tc briefly explain the functions of the black box called Accident Data Recorder. This device will remind you of a flight recorder for use in passenger cars. trucks and busses.

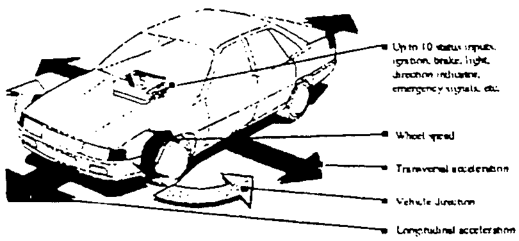


Figure **2: UDS system functions, sensors and status inputs**

The Accident Data Recorder is mainly composed of sensors measuring the transversal and longitudinal acceleration of the vehicle as well as its change of direction and road speed. The Accident Data Recorder discerns when and how long ignition. lamps. indicators and brakes have been activated. In case of an accident, this data is recorded with high precision 30 seconds before and 15 seconds after the accident. The Accident Data Recorder automatically detects the accident.

Up to three accidents can be stored in the Accident Data Recorder. Critical traffic situations can also be manually stored.

The Accident Data Recorder can easily be installed into any vehicle. There is no need for additional sensors

Accident Analysis **and Accident Prevention**

After this technical digression, it can be explained how the Accident Data Recorder contributes to optimising accident analyses and why it has an accident-preventing effect.

For **the accident analysis** expert, the Accident Data Recorder is an instrument, which provides objective accident data not available before. The analysis in view of accident reconstruction is made by a dedicated software package (see figure 3).

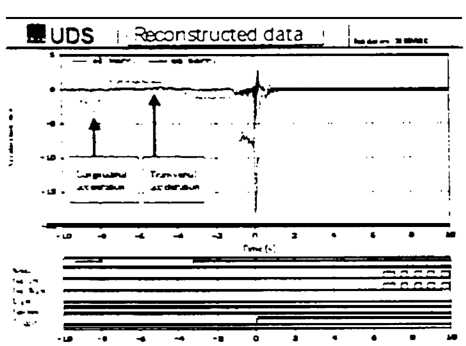


Figure **3: Accident Reconstruction**

If an accident occurs, the Accident Data Recorder stores up to 500 times per second the relevant information such as longitudinal and transversal acceleration. With this accurate information it is possible to analyse at the computer even the slightest details of the critical fraction of a second (see Annex for an accident analysis case).

A study conducted by bast (Bundesanstalt fin Strassenwesen = German Federal Road Agency) confirms the contribution of the Accident Data Recorder to improve accident analysis:

The bast study of June 1997 is based on information gathered from 42 real accidents in which vehicles fitted with the Accident Data Recorder were involved This shows that the Accident Data Recorder increases the degree of certainty to as much as 100% compared to traditional sources of information both in the pre-crash phase and in all other phases of the accident in respect of individual characteristics which, normally, cannot be fully ascertained without the Accident Data Recorder. These include driver reaction. road speed characteristics over a period of the last 30 seconds preceding the crash or the sequence in case of mass rear-end collisions. Information on vehicle deceleration and vehicle speed where no marks can be found on the road as well as the accurate chronological correlation of the actuation of vehicle controls can be safely established.

With **regard to accident prevention** experience gained with the Accident Data Recorder during the last four years became evident that it considerably influences the driving behaviour and thus contributes to accident prevention.

In a number of vehicle fleets the accident rate and damages incurred could be reduced by up to 30%. How can this achievement be explained? It is the knowledge about the fact that the driving behaviour can be checked objectively at any time which makes the driver to behave more attentively in critical accident-bound situations.

More careful driving will also cause less wear of material. The Accident Data Recorder can thus directly improve the running costs of a fleet company.

Out of the numerous series of preventive experience a few examples are shown below:

Police of Berlin

Fitting all 62 patrol cars of a Berlin police head office in 1996 reduced the number of accidents due to the driver's own fault by 20% and by 36% in emergency-trips. The cost involved could be reduced by approx. 25%

These positive results induced the Berlin police authority to equip all their patrol cars - these are more than 400 vehicles - with the Accident Data Recorder.

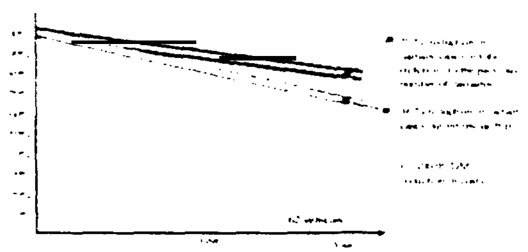


Figure 4: **Example - Police of Berlin**

WKD Pinkerton Security GmbH

In this company for property protection all passenger cars (approx. 100) that are used with a changing crew are fitted with Accident Data Recorders. This led the drivers to drive more carefully, adapting their driving behaviour to the individual traffic situation. with the result that the number of accidents decreased by 30%. minor damages even by 60% This in turn led to considerable savings of insurance premiums.

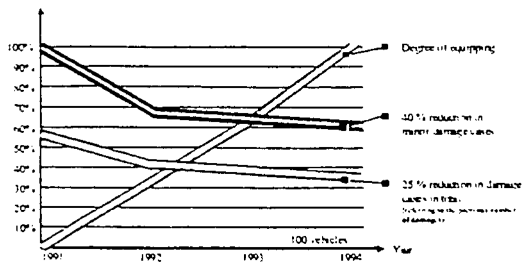


Figure 5: Example **- WKD Pinkerton Security, Bisingen. Germany**

WBO (Association of Baden-Württemberg Bus Operators)

In the pilot run promoted by the Baden-Württemberg Ministry of Transport with the Accident Data Recorder installed in busses run by WBO 123 Accident Data Recorders were involved. With the busses fitted with an Accident Data Recorder the number of accidents decreased between 15 and 20% compared with the reference period, depending of the company concerned.

Samovar

In Great-Britain, the Netherlands and Belgium nine vehicle fleets with a total of 341 vehicles fitted with data recording equipment participated in the research program SAMOVAR (Safety Assessment Monitoring on Vehicles with Automatic Recording) conducted by the European Union in the framework of the Drive Project V 2007.

Together with a control panel involved in similar tests a total of 850 vehicles participated in the program. The data were collected over a period of 12 months. The result shows that the accident rate decreased by 28.1% by the use of the vehicle data recorder.

The Samovar Report finally concluded that the intelligent use of a vehicle data recorder is able to make a considerable. distinctive, and independent benefit to road traffic safety.

CONCLUSION AND REQUESTS TO THE TRAFFIC POLICY

Onboard computers and specially the Accident Data Recorder have been designed as a contribution to road safety and legal security. The experiences at hand show that the systems can come up with the expectations placed in them. In view of the accident rates on our roads and the resulting human and economic damage we should make traffic policy aware of the opportunities of improving traffic safety conditions by means of vehicle data recording devices. It is also a question. which we have to find an answer for. whether we can accept a considerable lack ofjustice for traffic victims if modem technology offers relief.

ANNEX

Example of a Real Accident Analysis
Intersection Accident

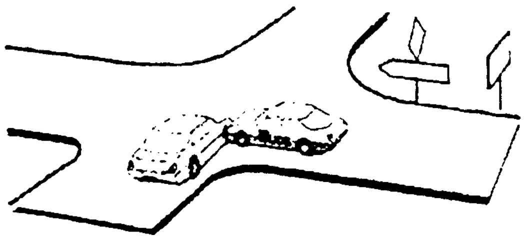


Figure 1: The accident situation

The picture shows a rather clear situation because of the priority-regulation on this junction. But the driver coming from the left accused the driver with the Accident Data Recorder of

- having entered the crossing at a too high speed
- having set the direction indicator to the right and thus causing him to enter the junction
- having shown no reaction to avoid the accident.

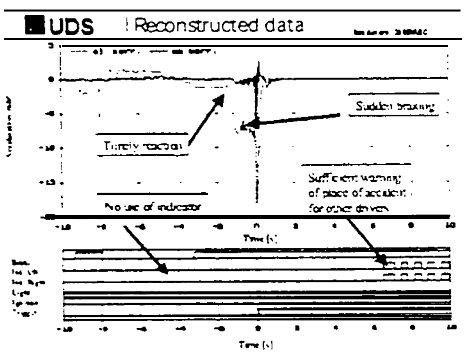


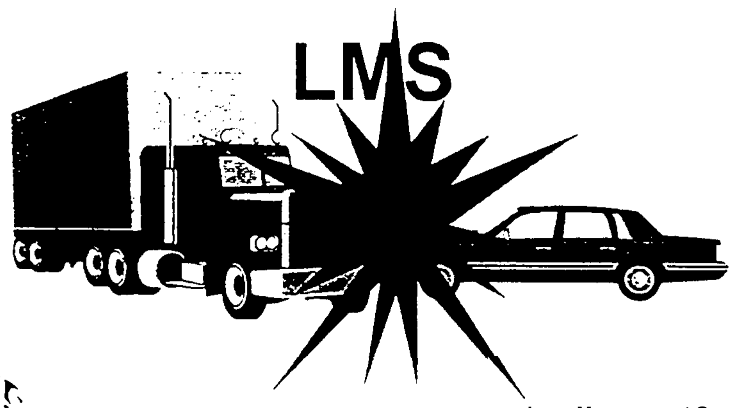
Figure 2: Reconstructed data

Figure 2 shows the raw data and proves at a glance that the driver coming from the tight is not responsible for the accident. He reacted in time (braking) and didn't use the indicator.

As information for the accident analyst: At the point of the accident, the relevant data is stored with 500 Hertz, which means 500 times acceleration data and other information per second. This is very helpful in cases of more complicated accident situations.

The Future is Now...

LOSS MANAGEMENT SERVICES, INC.



Loss Management Services, Inc.

36 Surf Road, Lindenhurst, New York 11757

Introduction

- For more than three years, LMS has been involved in field investigation, adjusting and managing transportation insurance claims.
- LMS is dedicated to developing cost effective ways to service the insurance claims industry's investigation and litigation procedures through 21st century technology.
- By combining high-tech sensors and digital imaging, LMS could solve the most vexing questions today involving automobile accidents....

What Happened?

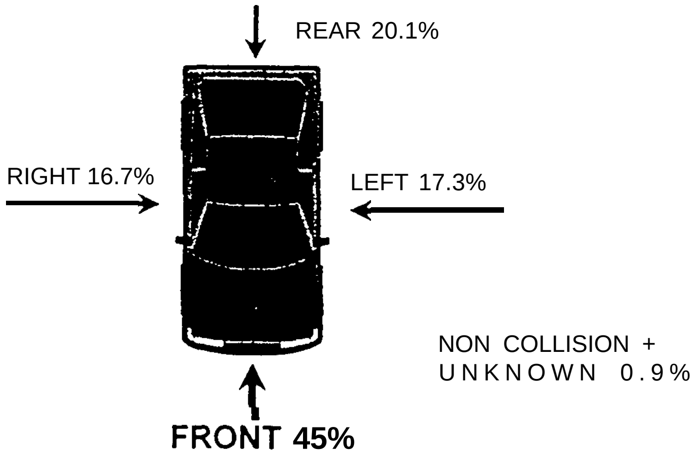
Who is at fault?

Loss Management Services, Inc.

36 Surf Road, Lindenhurst, New York 11757

Accident Statistics

Collision point of contact percentages



Loss Management Services, Inc.

36 Surf Road, Lindenhurst, New York 11757

Solution

The Mobile Accident Camera, "MACbox™" will:.

- **Secure a "driver's eye view" of *valuable* digital imagery.**
- **Provide a repository of information, including in-cabin acceleration data, for customers, insurance carriers, government agencies, and auto manufactures.**
- **Provide telemetry data.**
- **Better control and manage claim expenses and pay outs.**

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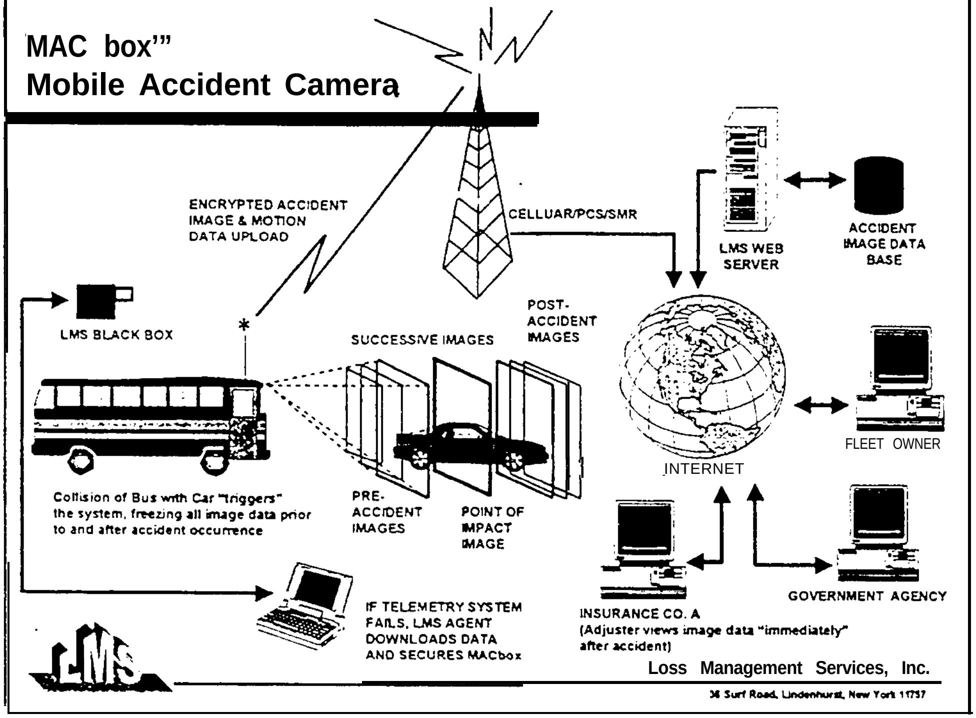
MAC box"
Mobile Accident Camera



Benefits

- Accurate Assessment of Liability
- Reduce the Cost of Litigation
- Reduce the Need for Expert Witnesses
- Reduce Costs Associated with Claims Investigations
- Assist with Accurate Claim Reserving
- Deter "ROAD RAGE"
- "G-Force" Comparison to the Extent of the Injury
- Acceleration data used improve cabin safety

Loss Management Services, Inc.
36 Surf Road, Lindenhurst, New York 11757

Applications

- Municipal Transportation Environment (Buses - Emergency Vehicles)
- Long Haul / Short Haul Trucking
- Taxi / Livery Services
- Commercial Passenger Transportation Fleets

LMS

Loss Management Services, Inc.
38 Surf Road, Lindenhurst, New York 11757

DRAFT

EDR Data Variable Selection - Proposed New & Expanded Codes

CUSTOMERS - new

- Outline the community of data users/ customers (expand descriptions):
  - * **PreCrash**: Crash avoidance, Defects, Driver actions (speeding)
    Users: Police (enforcement), Litigation, Cause research
  - * **Injury:** Crashworthiness, Injury risk, Crash severity, Occupant protection
    Users: Crash statistics, Biomechanics research., Litigation
    Restraint system performance and effectiveness evaluation
  - * **Sensor:** Crash pulse shape
    Users: Air bag crash sensing system algorithm design
  - * **PostCrash:** Crash notification; Users: EMS
- Put (four) CUSTOMER columns in front of each suggested **data** element.

PRIORITY - expand

- Add two (2) extreme/ limit categories:
  KEY (critical, must have) and
  0 (Not needed)
- Have each user community place their PRIORITY 'number' in their respective CUSTOMER columns for each data element:

  4- KEY, **3**- HIGH, **2**- MED, **1**- LOW, **0**- ZERO (none)

PRACTICABLE - new column (as recommended **2/17/99**)

- Is in-vehicle data available? How practical? Major technical or cost issues?
- Possible categories:
  H - High (data already in EDR module, or is available on data bus)
  M - Med (sensors in vehicle but not available on common data bus.)
  L - Low (data / sensors not in current vehicles; low feasibility)
  0 - No feasible way currently known to implement

WHEN POSSIBLE - expand

- Add two (2) **extreme/** limit categories:
  X (already **eXists** in some new vehicles today) and
  0 (technology not expected in foreseeable future)
- Entries should be restricted to manufacturers and technology suppliers.
  (NO entry is needed from others, as first 5 columns reflect their interests.)

DATA ELEMENTS - expand

- Add more detail/ refinement, e.g.,:
  Number of Occupants ⇒ FR, FC, FL, or Back Seat Occupied?
  [others??]
- Permit new data elements to be added to list ONLY IF of 'Key' or 'High' priority to at least one user/customer group.

PURPOSE

Compile all comments provided in one enlarged box.

First NHTSA Version

EDR DATA ELEMENT SELECTION FORM			
PRIORITY	**DATA ELEMENT**	**WHEN POSSIBLE**	**PURPOSE**
	Air bag inflation time		
	Air bag on/off switch position		
	Battery Voltage		
	Brake status - ABS		

Proposed Revision

DRAFT

CUSTOMER Priority (4,3,2,1,0)				EDR DATA ELEMENT SELECTION FORM			
Pre Crash	**Injury**	**Sensor**	**Post Crash**	**DATA ELEMENT**	**PRACTICAL H, M, L**	**WHEN POSS. X,3,2,1,0**	**PURPOSE**
0				Air bag inflation time			
				Air bag on/off switch position			
				Battery Voltage			
				Brake status - ABS			

PRIORITY : 4-Key, 3, 2, 1, 0-Not needed [Underlined codes are new proposals]
PRACTICABILITY: H-Hish, M-Medium, L-Low, O-Not feasible
WHEN POSSIBLE: X-Exists, 3, 2, 1, 0-Technonolosy not expected in foreseeable future

EDR WORKING GROUP MEMO

TO: John **Hinch**

FROM: Tom Kowalick

DATE: June **9, 1999**

RE: Proposal to classify EDR's as Type I **& Type** II

The following classification of event data recorder's **suggestion** was circulated to John Camey, Jeya Padmanaban, and Greg **Shaw**. The rationale for the suggestion was to model the method utilized by the railroad event data recorder working group to defining and classifying numerous data elements. Classification of **EDR's** is a simple solution to a complex problem.

Feedback from Jeya Padmanaban cited strong emphasis on providing weight and size of occupants, crash behavior of occupants in regards to in-position vs. out-of-position and sensing triggering indicators for rollovers.

Feedback from Greg Shaw cited that it made sense to start with a more modest device first and that it was hard to agree on a limited set of parameters. Greg would like to see peak acceleration **in** x, y, z and the time they occur after initiation of impact added to the type 1 **unit**.

Verbal feedback from John Camey indicated understanding of the need to define parameters (data elements) and possible classification of EDR types. John indicated that he would review and respond

CLASSIFICATION OF EVENT DATA RECORDERS (EDR'S)

Event Data **Recorder (EDR).**

An on-board **device capable** of monitoring, **recording,** and displaying pro-crash, crash, and post-crash data ● iomont **parameters** from a **vehicle,** ● vent **& driver.**

Use of EDR **parameter** data **elements**

The overall objective of utilizing EDR data is to **increase the safety** of our highway transportation **system. Recorded** data **provides** a more **accurate** ● ssoumont of ● vents loading up to an **accident** (pro-crash), **real time** (crash) and ● naiymis (postcrash).

Classification of **Event** Data **Recorders (EDR's)**

- **TYPE I**
- **TYPE II**

Establishins minimum **parameter** data **elements**

- **TYPE I = 6**
- **TYPE II = 6 +**

TYPE I **parameter** data **elements**

⇒ TIME
⇒ LOCATION
⇒ DIRECTION
⇒ VELOCITY
⇒ OCCUPANTS
⇒ SEAT BELT USAGE

TYPE ii **parameter data** ● iomonts

⇒ Ail TYPE I + OTHERS

□ Active suspension measurements □ advanced systems □ air bag inflation time □ air bag status □ air bag on/off switch position □ automatic collision notification □ battery voltage □ belt status each passenger □ brake status-service □ brake status-ABS □ collision avoidance, braking, steering, etc. □ crash pulse-longitudinal □ crash pulse-lateral □ CSS presence indicator □ Delta-V-longitudinal □ Delta-V-lateral □ electronic compass heading □ engine throttle status □ engine RPM □ environment-ice □ environment-wet □ environment-temp □ environment-lumination □ fuel level □ lamp status □ location-GPS □ number of occupants □ principal direction of force □ PRNDL position □ roll angle □ seat position □ stability control □ steering wheel angle □ steering wheel tilt position □ steering wheel rate □ time/date □ traction control □ traction coefficient □ transmission selection □ turn signal operation □ vehicle mileage □ vehicle speed □ VIN □ wheel speeds □ windshield wiper status □ yaw rate □ cruise control □ phone status □ brake pressure □ auto distance control □ suppression system status □ electric steering functional □ service engine soon lamp on □ throttle-by-wire □ ignition cycle counter □ tire pressure warning lamp on □ environment-temp inside □ 2 Vs 4 wheel drive

DATA FORM			
PRIORITY	DATA ELEMENT	WHEN POSSIBLE	PURPOSE
Low	Active suspension measurements		
Low	Advanced systems		
High	Air bag inflation time (time from start of crash to start of air bag inflation)		
?	Air bag status		
High	Air Bag on/off switch position		
med	Automatic collision notification		
med	Battery Voltage		
High	Belt status - each passenger		
med	Brake status - service		
med	Brake status - ABS		
med	Collision avoidance, braking, steering, etc		
High	Crash pulse - longitudinal		
High	Crash pulse - lateral		
med	CSS presence indicator		
High	Delta-V - longitudinal		
High	Delta-V - lateral		
med	Electronic compass heading		
med.	Engine throttle status		
med	Engine RPM		
med	Environment - ice		

DATA FORM			
PRIORITY	DATA ELEMENT	WHEN POSSIBLE	PURPOSE
med	Environment - wet		
med	Environment - temp		
med	Environment - lumination		
med	Environment - other		
low	Fuel level		
low	Lamp status		
med	Location - GPS data		
med	Number of occupants		
med	Principal Direction of Force		
med	PRNDL position		
med	Roll angle		

EDR Data Elements-REVISED

Sorted on Top Ten from Feb. 99

	PRIORITY	DC North America Plan	Top Ten from 2/17/99	DATA ELEMENT	Event Timing	WHEN POSSIBLE	PURPOSE
Line Item	High, Medium Low, TBD		Sort on	Description	P = Pre-crash Status-5 seconds before crash, C = During Crash-100ms	Near Term-6 months, Short Term-4* (GM) years, Long term -more than 4 years	1) Accident Reconstruction (incl. Litigation) & Improvement of Occupant Safety in Restraint & Vehicle Systems 2) Roadway Design Improvement Potential, 3) Improve Emergency Response
1		DC	1	Crash pulse - longitudinal	C	Long term	1
2		DC	1	Crash pulse - lateral	C	Long term	1
3		DC	1	*Lateral Acceleration just prior to crash*	P	Long term	1
4		DC	1	Delta-V - lateral	C	Long term	1
5		DC	1	Delta-V - longitudinal	C	Long term	1
6			1	Principal Direction of Force	C		1
7			2	Location - GPS data	P		2, 3
8		DC	3	Belt status - each passenger	P	Short term-Driver & Front Pass.	1,3
9			4	Number of occupants	P		1,3
10		DC	5	Brake status - ABS	P	Short term	1
11		DC	5	**Brake Applied**	P	Short term	1
12		DC	5	Engine RPM	P	Short term	1
13		DC	5	Engine throttle status	P	Short term	1
14		DC	5	PRNDL position*	P	Short term	1
15		DC	5	*Throttle-by-wire*	P	Short term	1
16		DC	5	Transmission selection*	P	Short term	1
17		DC	5	Vehicle speed	P	Short term	1,2
18			5	Brake status - service	P		1
19			5	*Electric Steering Functional*	P		1
20		DC	6	Time/date	P	Short term	1,2,3
21			7	Roll angle	C	Long term	1,2
22			8	Yaw rate	P	Long term	1
23			9	Active suspension measurements	P	Long term	1
24			9	Stability control	P	Long term	1
25			9	Traction coefficient (estimated from ABS computer)	P	Long term	1,2
26			9	Traction Control	P	Long term	1
27		DC	10	Air bag status (including lamp)	C	Near term	1
28		DC	10	Air Bag on/off switch position	P	Short term	1

EDR Data Elements-REVISED

Sorted on Top Ten from Feb. 99

Line Item	PRIORITY	DC North America Plan	Top Ten from 2/17/99	DATA ELEMENT	Event Timing	WHEN POSSIBLE	PURPOSE
Line Item	High, Medium, Low, TBD		Sort on	Description	P = Pre-crash Status-5 seconds before crash, C = During Crash-100ms	Near Term-6 months, Short Term-4* (GM) years, Long term -more than 4 years	1) Accident Reconstruction (incl. Litigation) & Improvement of Occupant Safety in Restraint & Vehicle Systems 2) Roadway Design Improvement Potential, 3) Improve Emergency Response
29		DC	10	*Supression System Status (Occupant Sensing)*	P	Short term	1
30		DC	10	Air bag inflation time (time from start of crash to start of air bag inflation)	C	Short term	1
31			10	CSS (child seat?) presence indicator	P	Short term	1
32		DC		*Ignition cycle counter*		Near Term	1
33		DC		Vehicle mileage	P	Near Term	1
34		DC		VIN	P	Near Term	1
35		DC		Battery (System) Voltage	P	Short term	1
36		DC		*Cruise Control Active*		Short term	1
37		DC		*Door Ajar Switch on*		Short term	1
38		DC		*Door Lock State*		Short term	1
39		DC		*Service Engine Soon Lamp on*		Short term	1
40		DC		*Tire Pressure warning lamp on*		Short term	1
41		DC		Turn signal operation	P	Short term	1
42		DC		Windshield wiper status	P	Short term	1
43				*2 x 4 wheel drive*	P		1,2
44				Advanced systems	P/C		1,2,3
45				Automatic collision notification	Post Crash		1,3
46				Collision avoidance, braking, steering, etc	P		1
47				Electronic compass heading	P		1,2
48				Environment - ice	P		
49				Environment - lumination	P		1,2
50				Environment - other	P		1,2
51				Environment - temp	P		1,2
52				Environment - wet	P		1,2

EDR Data Elements-REVISED

Sorted on Top Ten from Feb. 99

	PRIORITY	DC North America Plan	Top Ten from 2/17/99	DATA ELEMENT	Event Timing	WHEN POSSIBLE	PURPOSE
Line Item	High, Medium Low, TBD		Sort on	Description	P = Pre-crash Status-5 seconds before crash, C = During Crash-100ms	Near Term-6 months, Short Term-4 (GM) years, Long term -more than 4 years	1) Accident Reconstruction (incl. Litigation) & Improvement of Occupant Safety in Restraint & Vehicle Systems 2) Roadway Design Improvement Potential, 3) Improve Emergency Response
53				*Environment-temp (inside)*			1,2
54				*Environment-temp (outside)*			1,2
55				Fuel level	P		1
56				Lamp status	P		1
57				Seat position	P		1
58				*Service Vehicle Soon Lamp on*			1
59				steering wheel angle	P		1
60				Steering wheel rate	P		1
61				Steering wheel tilt position	P		1
62				Wheel speeds	P		1

DATA FORM
FEDERAL HIGHWAY ADMINISTRATION Input

PRIORITY	DATA ELEMENT	WHEN POSSIBLE	PURPOSE/COMMENTS
Low	Active suspension measurements	Long Term	
High	Advanced systems	Long Term	Priority dependent on what each advanced system is. If the advanced system is Advanced Collision Avoidance, should be high to determine if activated during crash.
Low	Air bag inflation time (time from start of crash to start of air bag inflation)	Long Term	
High	Air bag status	Short Term	Necessary to determine if this safety countermeasure deployed during crash. Should also be able to determine which air bag deployed (Driver, Passenger, Side).
High	Air Bag on/off switch position	Short Term	If no air bag deployment during crash, necessary to determine why.
High	Automatic collision notification	Long Term	Necessary to determine if this safety collision notification system was activated as a result of crash.
Medium	Battery Voltage	Mid Term	Necessary to determine when and if sensors and electronic logic are operational during a crash.
High	Belt status - each passenger	Short Term	Necessary to determine if this safety counter measure was used by each passenger. Therefore, must be related to a sensor to determine what seats contained occupants.

DATA FORM
FEDERAL HIGHWAY ADMINISTRATION Input

PRIORITY	DATA ELEMENT	WHEN POSSIBLE	PURPOSE/COMMENTS
Medium	Brake status - service	Mid Term	Necessary to determine if the brakes were operational during a crash.
Medium	Brake status - ABS	Mid Term	Necessary to determine if ABS system was operational during a crash.
High	Collision avoidance, braking, steering, throttle opening, etc	Short Term	Necessary to determine driver behavior during a crash. This type of information is very important for future modeling of driver behavior and development of new or improved crash test procedures.
High	Crash pulse - longitudinal	Short Term	This type of information is very important for modeling of individual motor vehicle collisions and development of new or improved crash test procedures.
High	Crash pulse - lateral	Short Term	This type of information is very important for modeling of individual motor vehicle collisions and development of new or improved crash test procedures.
Low	CSS presence ndicator	Long Term	I assume that "CSS" stands for child seat sensor.
High	Delta-V - longitudinal	Short Term	This type of information is very important for modeling of individual motor vehicle collisions and development of new or improved crash test procedures.
High	Delta-V - lateral	Short Term	This type of information is very important for modeling of individual motor vehicle collisions and development of new or improved crash test procedures.
Low	Electronic compass heading	Long Term	

DATA FORM
FEDERAL HIGHWAY ADMINISTRATION Input

PRIORITY	DATA ELEMENT	WHEN POSSIBLE	PURPOSE/COMMENTS
High	Engine throttle status	Short Term	Necessary to determine driver behavior during a crash. This type of information is very important for future modeling of driver behavior and development of new or improved crash test procedures.
Low	Engine RPM	Long Term	
Medium	Environment - ice	Mid Term	I am not sure how environmental data can be determined from motor vehicle sensors. However, from a highway safety standpoint environment conditions during collision are very important.
Medium	Environment - wet	Mid Term	Same
Medium	Environment - temp	Mid Term	Same
Medium	Environment - lumination	Mid Term	Same
Medium	Environment - other	Mid Term	Same
Low	Fuel level	Long Term	
Low	Lamp status	Long Term	It is not clear if this refers to all lamps or to specific lamps such as the brake lamp or turn signal lamps.
High	Location - GPS data	Short Term (Immediately)	This is FHWA's number one priority data item. Location of individual motor vehicle crashes is very important information which can be used by FHWA and the States to determine specific roadway/roadside features or objects that may be causing or contributing to collisions.

DATA FORM
FEDERAL HIGHWAY ADMINISTRATION Input

PRIORITY	DATA ELEMENT	WHEN POSSIBLE	PURPOSE/COMMENTS
High	Number and seating location of occupants	Short Term	Related to “Belt status - each passenger.” These sensors are necessary to determine seat belt use or non-use by each motor vehicle occupant
Medium	Principal Direction of Force	Mid Term	This type of information is very important for modeling of individual motor vehicle collisions and development of new or improved crash test procedures.
Low	PRNDL position	Long Term	
Medium	Roll angle	Mid Term	This type of information is very important for modeling of individual motor vehicle collisions and development of new or improved crash test procedures.
Low	Seat position	Long Term	
Low	Stability control	Long Term	
High	Steering wheel angle	Short Term	Necessary to determine driver behavior during a crash. This type of information is very important for future modeling of driver behavior and development of new or improved crash test procedures.
Low	Steering wheel tilt position	Long Term	
Medium	Steering wheel rate	Mid Term	Necessary to determine driver behavior during a crash. This type of information is very important for future modeling of driver behavior and development of new or improved crash test procedures.

DATA FORM
FEDERAL HIGHWAY ADMINISTRATION Input

PRIORITY	DATA ELEMENT	WHEN POSSIBLE	PURPOSE/COMMENTS
High	Time/date	Short Term	Time of day is necessary from a roadway safety design standpoint to determine relative magnitude of total daytime and night time motor vehicle crashes.
Low	Traction Control	Long Term	
Medium	Traction coefficient (estimated from ABS computer)	Mid Term	I am assuming that this gives the coefficient of friction between the tires and road surface. This type of information is important for modeling of individual motor vehicle crashes and for a determination of the relative skid resistance of the many different road surface materials.
Low	Transmission selection	Long Term	Does this differ from "PRNDL position"?
Medium	Turn signal operation	Mid Term	
Low	Vehicle milage	Long Term	
High	Vehicle speed	Short Term	This type of information is very important for modeling of individual motor vehicle collisions and development of new or improved crash test procedures.
High	VIN	Short Term	The specific model and type of motor vehicles involved in each crash is very important for modeling of individual motor vehicle collisions and development of new or improved crash test procedures.
Low	Wheel speeds	Long Term	
Medium	Windshield wiper status	Mid Term	

DATA FORM
FEDERAL HIGHWAY ADMINISTRATION Input

PRIORITY	DATA ELEMENT	WHEN POSSIBLE	PURPOSE/COMMENTS
Medium	Yaw rate	Mid Term	This type of information is very important for modeling of individual motor vehicle collisions and development of new or improved crash test procedures.
	R/O Sensing		We cannot even render a guess regarding what "R/O Sensing" refers too.
Medium	Suppression System Status	Mid Term	It is believed that this refers to automatic disabling of the air bag actuation electronics if a child is present in the seat. If no air bag was deployed during a crash and an occupant was sensed, this indication is necessary to determine why/ It is thought that NHTSA considers this data item an individual privacy data element.

LOSS MANAGEMENT SERVICES, INC.

DATA FORM			
PRIORITY	**DATA ELEMENT**	**WHEN POSSIBLE**	**PURPOSE**
MED.	Active suspension measurements	NEAR TERM	VEHICLE STABILITY
HI	FIFO DIGITAL CAMERA Advanced systems	NEAR TERM	DRIVER'S EYE VIEW OF EVENT PRE/POST
—	Air bag inflation time (time from start of crash to start of air bag inflation)	—	INSURANCE/MEDICAL RESPONSE LIABILITY —
HI	Air bag status	SHORT TERM	PASSENGER SAFETY
MED.	Air Bag on/off switch position	NEAR TERM	MINORS/INFANT PASSENGER SAFETY
HI	Automatic collision notification	NEAR TERM	MEDICAL, INSURANCE LIABILITY
LOW	Battery Voltage	SHORT TERM	VEHICLE CHARGE MONITOR
HI	Belt status - each passenger	SHORT TERM	SAFETY, INSURANCE LIABILITY
HI	Brake status - service	SHORT TERM	VEHICLE SAFETY
HI	Brake status - ABS	SHORT TERM	VEHICLE SAFETY
HI	Collision avoidance, braking, steering, etc	SHORT TERM	PASSENGER SAFETY
HI	Crash pulse - longitudinal	NEAR TERM	VEHICLE "STIFFNESS" & INSURANCE/MEDICAL
HI	Crash pulse - lateral	NEAR TERM	VEHICLE "STIFFNESS" & INSURANCE/MEDICAL
—	CSS presence indicator	—	—
HI	Delta-V - longitudinal	NEAR TERM	VEHICLE STABILITY
HI	Delta-V - lateral	NEAR TERM	VEHICLE STABILITY
LOW	Electronic compass heading	NEAR TERM	DRIVER
—	Engine throttle status	—	—
MED.	Engine RPM	NEAR TERM	DETECT DRIVER'S APPROACHING SPEED/REL LIMIT
MED.	Environment - ice	NEAR TERM	ROAD SAFETY & INSURANCE LIABILITY

JM

DATA FORM			
PRIORITY	**DATA ELEMENT**	**WHEN POSSIBLE**	**PURPOSE**
HI	Environment - wet	NEAR TERM	ROAD SAFETY & INSURANCE LIABILITY
LOW	Environment - temp	NEAR TERM	ROAD SAFETY & INSURANCE LIABILITY
MED.	Environment - lumination	NEAR TERM	ROAD SAFETY & INSURANCE LIABILITY
HI	VISUAL Environment - other	NEAR TERM	DRIVER RESPONSIBILITY & LIABILITY RD SAFETY
—	Fuel level	—	—
MED.	Lamp status	NEAR TERM	DRIVER SAFETY & INSURANCE LIABILITY
HI	Location - GPS data	NEAR TERM	MEDICAL ASSISTANCE & DRIVER SAFETY
HI	Number of occupants	NEAR TERM	MEDICAL ASSISTANCE & INSURANCE LIABILITY
HI	Principal Direction of Force	NEAR TERM	INSURANCE LIABILITY
—	PRNDL position	—	—
HI	Roll angle	NEAR TERM	VEHICLE STABILITY & ROAD SAFETY
MED.	Seat position	NEAR TERM	PASSENGER STATURE VS. AIR BAG IMPACT
MED.	Stability control	NEAR TERM	
—	Steering wheel angle	—	—
—	Steering wheel tilt position	—	—
—	Steering wheel rate	—	—
HI	Time/date	NEAR TERM	INSURANCE LIABILITY
—	Traction Control	—	—
—	Traction coefficient (estimated from ABS computer)	—	—
—	Transmission selection	—	—
MED.	Turn signal operation	NEAR TERM	INSURANCE LIABILITY
LOW	Vehicle milage	NEAR TERM	ROAD TRIP INDICATOR VS. DROWSYNESS
HI	Vehicle speed	NEAR TERM	PASSENGER SAFETY, ROADWAY SAFETY, INSURANCE LIABILITY

JH

DATA FORM			
PRIORITY	**DATA ELEMENT**	**WHEN POSSIBLE**	**PURPOSE**
MED.	VIN	NEAR TERM	LAW ENFORCEMENT & INSURANCE POLICY
MED.	Wheel speeds	NEAR TERM	MECHANICAL DETECTION / VERIFICATION
HI	Windshield wiper status	NEAR TERM	DRIVER'S EYE VIEW & INSURANCE LIABILITY
HI	Yaw rate	NEAR TERM	VEHICLE STABILITY

JM

TC Collision Avoidance

DATA FORM

PRIORITY	DATA ELEMENT	WHEN POSSIBLE	PURPOSE
Low	Active suspension measurements	Long	
HIGH	Advanced systems	Short	Indicate safety features and type
HIGH	Air bag inflation time (time from start of crash to start of air bag inflation)	Short	
HIGH	Air bag status	Short	
HIGH	Air Bag on/off switch position	Short	
LOW	Automatic collision notification	Long	
Low	Battery Voltage	Long	
HIGH	Belt status - each passenger	Short	Police report is unreliable for injured & not injured passengers.
HIGH	Brake status - service	Short	Was the driver braking? for how long?
HIGH	Brake status - ABS	Short	same ↑ + did ABS engage?
HIGH	Collision avoidance, braking, steering, etc	Short	Better info on crash events
Low	Crash pulse - longitudinal	Long	
Low	Crash pulse - lateral	Long	
	CSS presence indicator ?		
HIGH	Delta-V - longitudinal	SHORT	Better info on crash events
MED	Delta-V - lateral	Long	Spinning?
HIGH	Electronic compass heading	Short	Vehicle direction before crash - Crash reconstruction.
LOW	Engine throttle status	Long	

TC Collision Avoidance

DATA FORM

PRIORITY	DATAELEMENT	WHEN POSSIBLE	PURPOSE
LOW	Engine RPM	LONG	
HIGH	Environment - ice	SHORT	Improved info on environment
HIGH	Environment - wet	SHORT	
HIGH	Environment - temp	SHORT	
HIGH	Environment - lumination	SHORT	
	Environment - other		
LOW	Fuel level	LONG	
High	Lamp status	SHORT	Headlight & Brake lamp status/ Visibility
Low	Location - GPS data	LONG	
Low	Number of occupants	LONG	Currently provided in Police report.
Med	Principal Direction of Force	LONG	Crash configuration
Low	PRNDL position	LONG	
	Roll angle ?		
MED	Seat position	LONG	
HIGH	Stability control	SHORT	Cause of crash
LOW	Steering wheel angle	LONG	
Low	Steering wheel tilt position	LONG	
HIGH	Steering wheel rate	SHORT	Evasive manoeuvres ?
HIGH	Time/date	SHORT	Correlate crash [illegible] [illegible] with vehicle [illegible]
HIGH	Traction Control	SHORT	status ?
HIGH	Traction coefficient (estimated from ABS computer)	SHORT	Cause of crash
LOW	Transmission selection	LONG	

TC Collision Avoidance

DATA FORM

PRIORITY	DATAELEMENT	WHEN POSSIBLE	PURPOSE
MED	Turn signal operation	LONG	CRASH INVESTIGATION
LOW	Vehicle milage	LONG	
HIGH	Vehicle speed	SHORT	Cause of crash
HIGH	VIN	SHORT	LINK to VEHICLE DATA
LOW	Wheel speeds	LONG	Cause of crash
LOW	Windshield wiper status	LONG	
HIGH	Yaw rate	SHORT	Cause of crash / Events in CRASH

TC Collision Investigation

DATA FORM			
PRIORITY	**DATA ELEMENT**	**WHEN** Needed ~~**POSSIBLE**~~	**PURPOSE**
Low	Active suspension measurements	Long	Evaluation of causal factors
Med	Advanced systems	Short	Evaluation of ACRS deployments
High	Air bag inflation time (time **from** start of crash to start of air bag inflation)	Near	Evaluation of ACRS deployments
High	Air bag status	Near	Evaluation of ACRS (non-)deployments
High	Air Bag on/off switch position	Near	Evaluation of ACRS (non-)deployments
—	Automatic collision notification	—	No requirement
—	**Battery** Voltage	—	No requirement
High	Belt status - each passenger	Near	Belt use determination
Med	Brake status - service	Short	Evaluation of causal factors
Med	Brake status - ABS.	Short	Evaluation of causal factors
High	Collision avoidance, braking, steering, etc	Near	Evaluation of causal factors
High	Crash pulse - longitudinal	Short	Crash severity
High	Crash pulse - lateral	Short	Crash severity
Med	CSS presence indicator	Short	Evaluation of advanced ACRS
High	Delta-V - **longitudinal**	Near	Crash severity / PDOF
High	Delta-V - lateral	Near	Crash severity / PDOF
Med	**Electronic** compass heading	Short	Collision configuration
High*	Engine throttle status	Near	Evaluation of causal factors

* Engine RPM acceptable alternative

TC Collision Investigation

DATA FORM

PRIORITY	DATA ELEMENT	WHEN ~~POSSIBLE~~ Needed	PURPOSE
High	Engine RPM	Near	Or engine throttle position
Low	Environment - ice	Long	Reasonable information
Low	Environment - wet	Long	generally available
Low	Environment - temp	Long	from police reported
Low	Environment - lurnination	Long	data
—	Environment - other	—	
—	Fuel level	—	Not required
Low	Lamp status	Long	Evaluation of causal factors
Low	Location - GPS data	Long	POI
Low	Number of occupants	Long	Generally available (police)
—	Principal Direction of Force	—	Determine from Delta-V
Low	PRNDL position	Long	Speed via RPM
—	Roll angle	—	No requirement
Med	Seat position	Short	Evaluation of advanced ACRS
Low	Stability control	Long	Evaluation of causal factors
High	Steering wheel angle	Near	Evaluation of causal factors
—	Steering wheel tilt position	—	No requirement
Med	Steering wheel rate	Short	Evaluation of causal factors
—	Time/date	—	No requirement
Low	Traction Control	Long	Evaluation of causal factors
High	Traction co efficient (estimated from ABS computer)	Near	Crash severity (reconstruction)
High	Transmission selection	Near	With RPM

TC Collision Investigation

DATA FORM			
PRIORITY	DATA ELEMENT	WHEN ~~POSSIBLE~~ Needed	PURPOSE
—	Turn signal operation	—	No requirement
—	Vehicle milage	—	No requirement
High	Vehicle speed	Near	Collision severity v(t)
—	VIN	—	No requirement
Med	Wheel speeds	Short	Collision severity/reconstruction
—	Windshield wiper status	—	No requirement
High	Yaw rate	Short	Collision configuration/ reconstruction

TC Ergonomics.
All "Hi" relevant to crash avoidance issues.

DATA FORM

PRIORITY	DATA ELEMENT	WHEN POSSIBLE	PURPOSE
	Active suspension measurements		
	Advanced systems		
	Air bag inflation time (time from start of crash to start of air bag inflation)		
	Air bag status		
	Air Bag on/off switch position		
	Automatic collision notification		
	Battery Voltage		
	Belt status - each passenger		
	Brake status - service		
	Brake status - ABS		
H1	Collision avoidance, braking, steering, etc		
	Crash pulse - longitudinal		
	Crash pulse - lateral		
	CSS presence indicator		
	Delta-V - longitudinal		
	Delta-V - lateral		
	Electronic compass heading		
Hi	Engine throttle status		

TC Ergonomics

DATA FORM			
PRIORITY	DATA ELEMENT	WHEN POSSIBLE	PURPOSE
H1	**Engine RPM**		
H1	**Environment - ice**		
H1	Environment - wet		
H1	Environment - temp		
H1	Environment - lumination		
	Environment - other.		
	Fuel level		
H1	Lamp status		
	Location - GPS data		
H1	Number of occupants		
	Principal Direction of Force		
	PRNDL position		
	Roll angle		
	Seat position		
H1	Stability control		
H1	Steering wheel angle		
	Steering wheel tilt position		
H1	Steering wheel rate		
H1	Time/date		
	Traction Control		
	Traction coefficient (estimated from ABS computer)		
	Transmission selection		

TC Ergonomics

DATA FORM			
PRIORITY	DATA ELEMENT	WHEN POSSIBLE	PURPOSE
H1	Turn signal operation		
H1	Vehicle milage		
H1	Vehicle speed		
H1	VIN		
H1	Wheel speeds		
	Windshield wiper status		
	Yaw rate		
H1	cell phone use		
H1	navig system interaction		
H1	voice interaction	(Auto-pc)	
H1	ACC use		

Automated Collision Notification:

Help is on the way!

Arthur A. Carter
National Highway Traffic Safety Administration
Office of Vehicle Safety Research
Advanced Safety Systems Research Division

*What% an Automated **Collision** Notification (A **CN)** Sys tern?*

April 27, 1999 *NHTSA Research& Development*

- An ACN System consists of an In-Vehicle System that connects via Wireless Communications Systems to an Emergency Services Dispatch Location to:
  - **Notify Emergency Response Personnel of Crash**
  - **Provide Vehicle Location & Information on Crash Severity**
- Goal is Reducing Response Time for Medical Assistance
- Activation May be:
  - **Crash Sensor, Air Bag Deployment, or other means**

Why Do We Need ACN Capability?

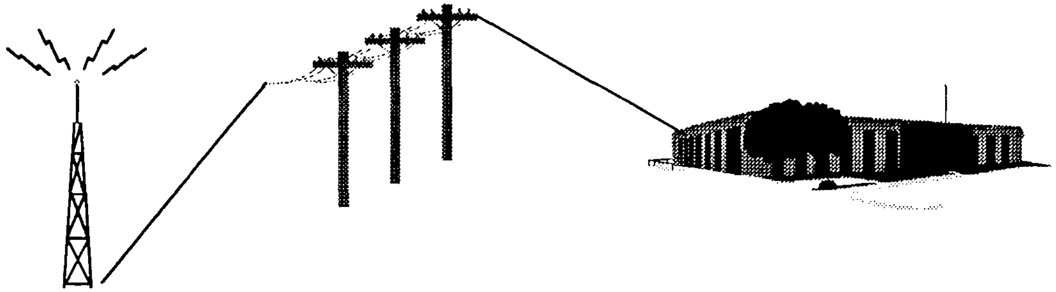
- Time of Crash to EMS Notification (1996)
  - USA average:
    - 7 minutes rural
    - 4 minutes urban
  - Differs greatly from state-to-state
    - North Dakota - 17 minutes
    - Maryland - 2.2 minutes

ACN *Targeted Crashes*

- **Rural, single vehicle crashes:**
  - Longer notification times
  - Few potential “Good Samaritans”
  - Poor location references

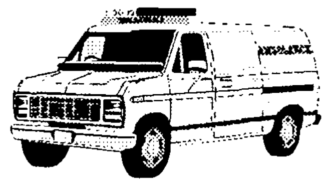
Example ACN *System*

April 27, 1999 *NHTSA Research& Development*

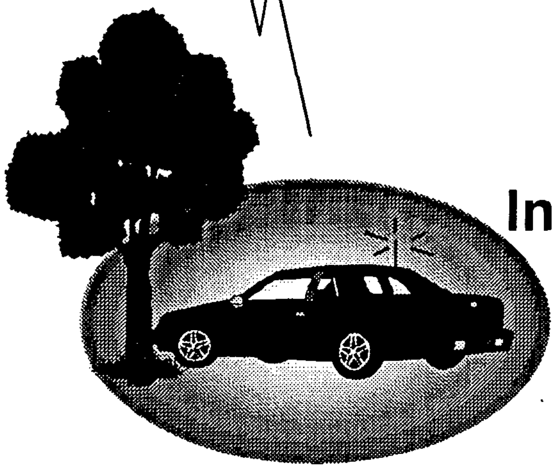


Emergency Services Dispatch
- Data Modem
- Graphic Display of Crash Location & Information
- Voice Contact w/Vehicle

Crash Notification Message

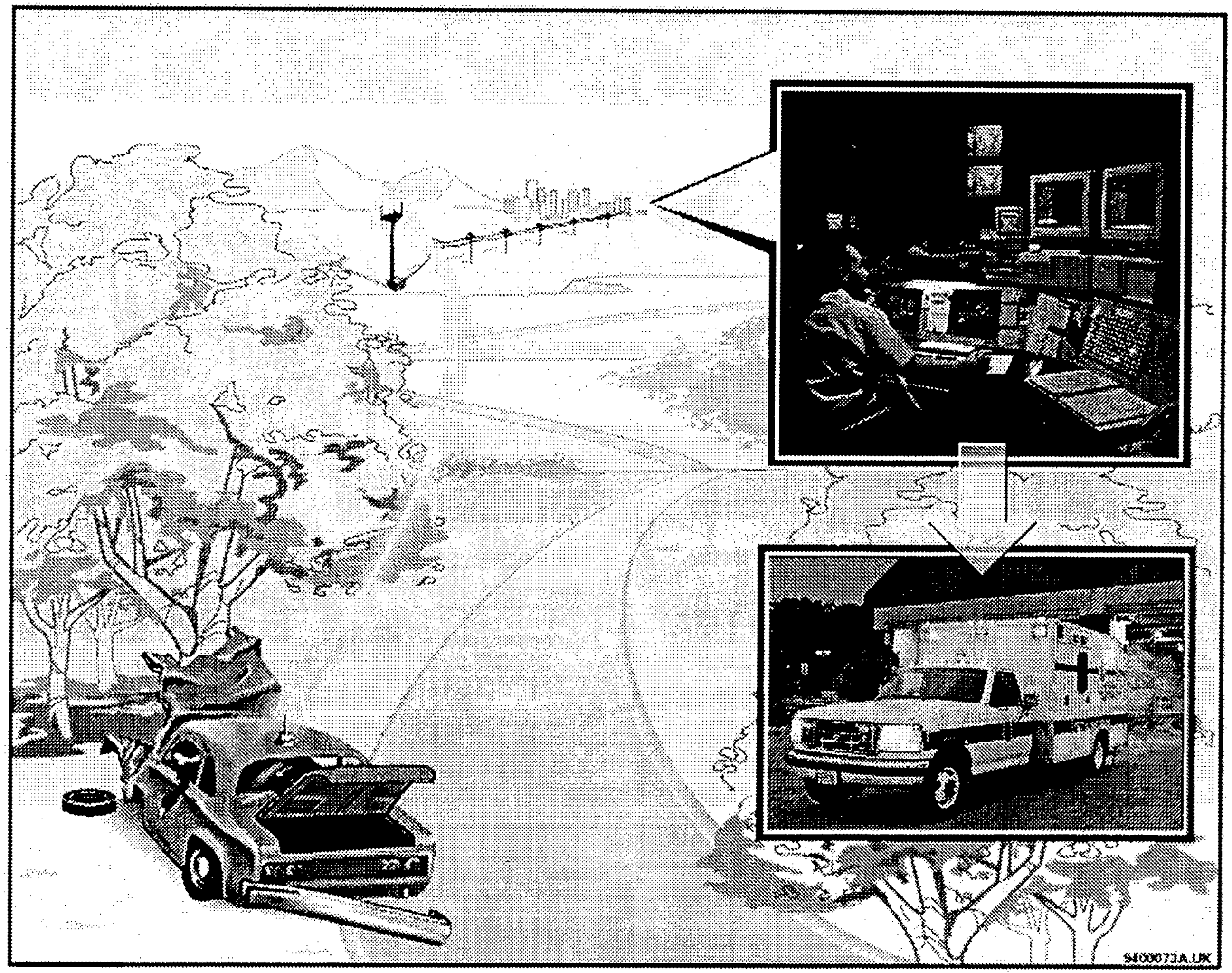


EMS Notification
- Location
- Crash Severity



In-Ve hicle System
- Crash Sensor
- GPS Receiver
- Cellular Phone

ACN Flow



***NHTSA** Vision*

Improve victim care following a crash by addressing the full spectrum of the emergency services through a seamless nationwide emergency communications network, using the most advanced technology.

NHTSA *Goals*

- Improve emergency access and response
  - The "Post-Crash" problem
- Address total "Post-Crash" problem
  - "Field-to-Facility" or "End-to-End" system
- Health care improvement

NHTSA Program

- **Addresses full range of issues**
  - Organization
  - Procedures
  - Technology
- **Emphasis on process**

NHTSA's ACN Deployment Strategy

- Precursor Technology Assessment
  - Define system requirements
  - Assess technology from a theoretical **&** laboratory perspective
  - Conduct technology testing in a field l operational environment
- Conduct large scale Field Operational Test (FOT) using results of technology assessment for guidance

Precursor Technology Assessment

- Undertaken by The Johns Hopkins University Applied Physics Laboratory
- Problem assessment
- Problem decomposition:
  - Crash sensing
  - Vehicle location
  - Communications
- Evaluate emerging technologies for applicability

- Conclusions:
  - Recommend the most promising, existing technologies:
    - Solid state accelerometers for crash sensing
    - Global Positioning Systems (GPS) for vehicle location
    - Cellular telephone for communications
  - Need for baseline data
  - Need for geo-location uncertainty parameter
  - Potential for success of a FOT of ACN is high

Conduct Large Scale Field Operational Test (FOT)

. The purpose of this FOT is to evaluate improvements offered by an Automated Collision Notification (ACN) system.

. This FOT serves as a bridge between the research and development and deployment of commercial ACN systems.

FOT Objectives

- Demonstrate end-to-end system feasibility
- Demonstrate reliability of ACN In-Vehicle Equipment
- Measure the survivability **&** performance of the sensors **&** instrumentation
- Demonstrate measurable improvement in efficiency of emergency medical services
  - **Quantify reduction in EMS response times**
- Evaluate user (drivers, dispatchers, etc.) acceptance **&** system costs
- Identify institutional issues with deployment

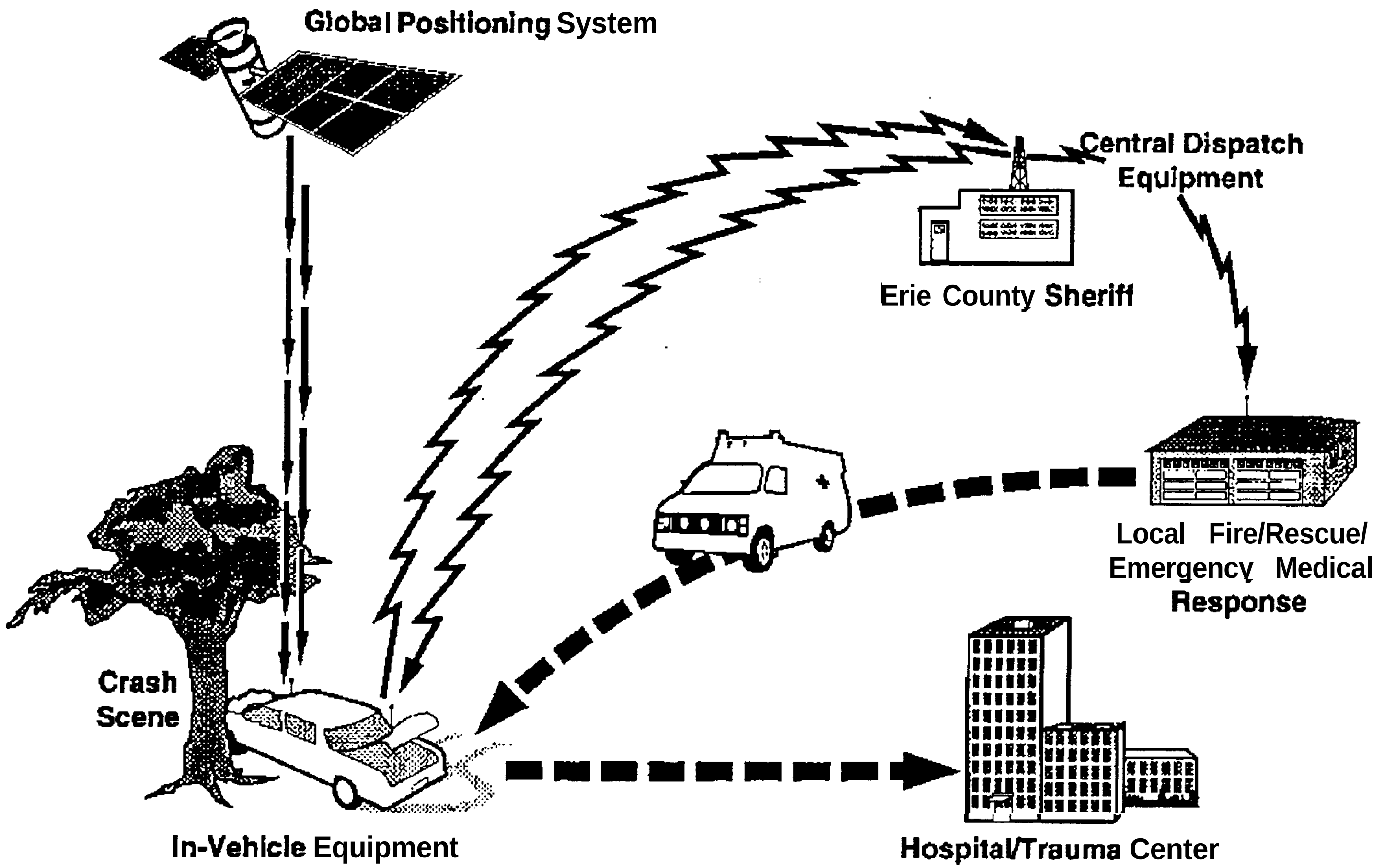
Evaluation Philosophy

- Independent Evaluator **(JHU/APL)**
  - **Not part of the test team**
  - **Not a product manufacturer or consumer service provider**
  - **Technical expert**
- Employ a systems engineering approach:
  - **Clearly define quantifiable goals & objectives**
  - **Identify MOE's & MOP's**
  - **Ensure appropriate data collected**
  - **Perform data analysis**
- Focus on evaluation of system benefits **&** deployment issues

Cooperative Agreement Award

- **Project Title: Field Operational Test for Automated Collision Notification**
- **NHTSA cooperative agreement No: DTNH22-95-H-07429**
- **Grantee: Calspan Operations of the Veridian Corporation**
- **Estimated total project cost: ~$5M**
- **Award date: September 30, 1995**
- **Completion date: September 1999**

ACN *FOT Flow*


Global Positioning System
Central Dispatch Equipment
Erie County Sheriff
Local Fire/Rescue/ Emergency Medical Response
Crash Scene
In-Vehicle Equipment
Hospital/Trauma Center

- The ACN system utilizes the current Emergency Messaging Infrastructure:
  - **As is the case with current 9-1-1 Cellular Phone calls, all ACN Messages will be received by the Erie County Sheriff**
  - **Calls will then be routed to the appropriate Public Safety Answering Points (PSAP) to dispatch emergency services**
  - **Emergency medical dispatchers at the Erie County Emergency Communications Center will be alerted to provide instructions to vehicle occupants.**

Project Overview.?!
ACN Concept

- ACN Concept:
  - **Automatically notifies local EMS in event of a crash:**
    - **Crash sensing: On-board 3 axes, solid state accelerometers**
    - **Vehicle location: via GPS**
    - **Digital Signal Processor to implement crash severity estimation algorithm & format message**
    - **Cellular phone to transmit data message to Emergency Dispatcher & open voice line to vehicle occupants**
- Operational test is located in Erie County, NY
- Targets single-vehicle rural crashes to reduce EMS notification time
- A Goal of 1,000 Vehicles will be installed with ACN system

ACN *In-Vehicle Module **(IVM)***

The **Calspan** ACN System vehicle system consists of

- **IVM containing central processor unit, crash sensors, cellular phone modem, & Global Positioning System (GPS) receiver**
- **Cellular phone handset & antenna**
- **GPS antenna**

The IVM performs the following functions

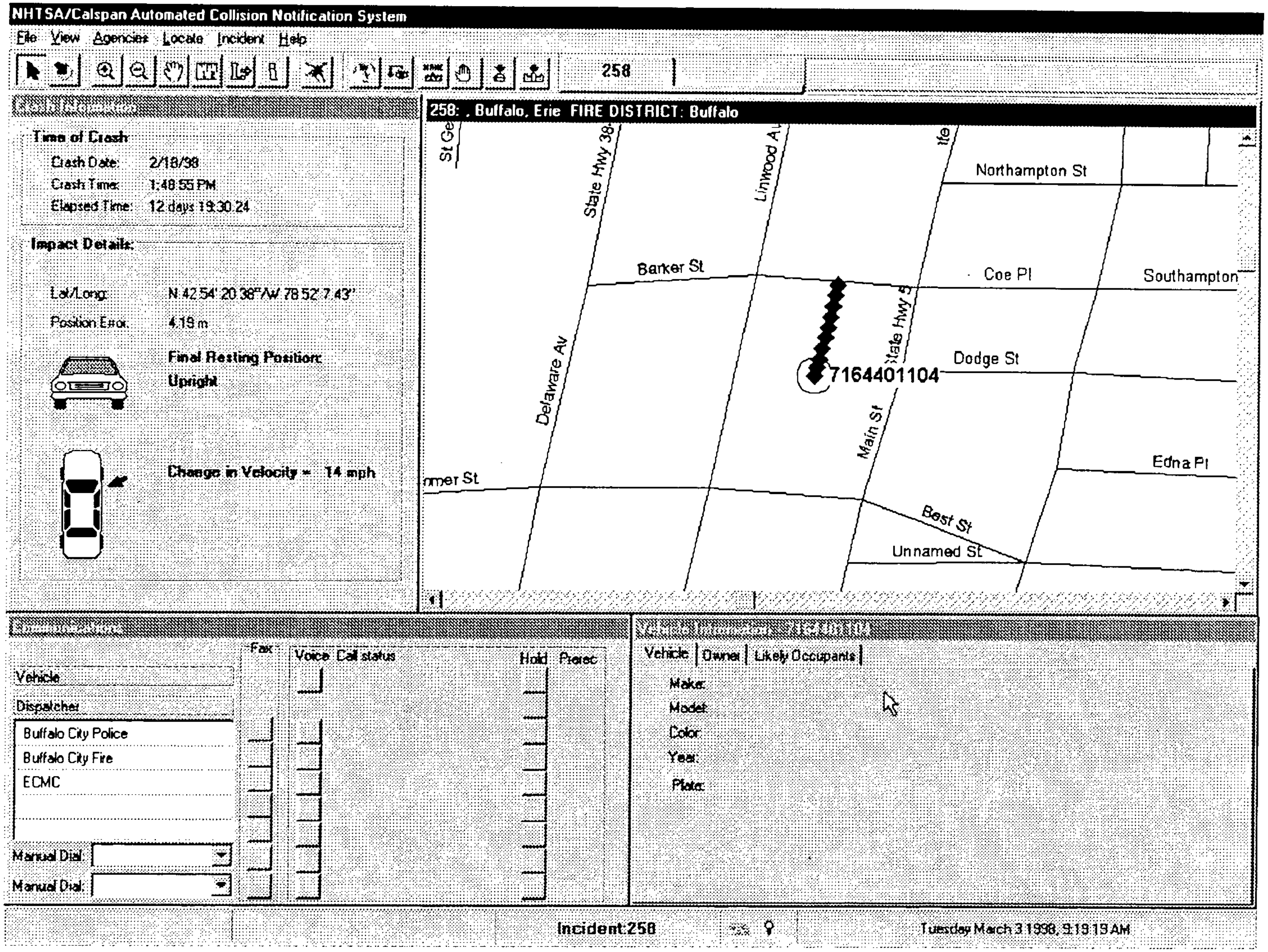
- **Determines that a crash has taken place & estimates its severity**
- **Automatically dials the Erie County Sheriff's Department & transmits a digital message with the crash information including vehicle position**
- **Switches the cellular phone to voice mode allowing the dispatcher to maintain contact with the vehicle's occupants**

ACN Data Collected? Reported

- 3 axis Acceleration Collected:
  - Data Reported:
    - Computed (estimated) Delta Velocity (delta v)
    - Computed Principal Direction of Force (PDOF)
    - Final Resting Position (roll-over indication)
- Geo-location (latitude/longitude) Collected via GPS:
  - Data Reported:
    - "Street Address" : Dispatcher software converts lat/long via a Geographical Information System
    - Position error
- Date and Time

*ACN **9-1-1** Dispatcher Screen*

April 27, 1999 *NHTSA Research& Development*



Project Overview.? CET Concept

. CET(Crash Event Timer): Inexpensive Crash Detector & Timer:

- **Will provide accurate time-of-crash measure, i.e., establish a reliable baseline for time between crash & EMS notification**
- **Address poor accuracy of crash times from police reports**
- **Goal: Installation in ~4,000 privately owned vehicles**
- **CET data will be:**
  - Compared to ACN notification times
  - Used to corroborate existing databases of EMS Response Times (Police, PSAP, & Ambulance Reports)

Project Overview,.?
CET

- Single axis mechanical switch
- **3-week** countdown timer
- **Calspan** crash investigation team reads timer using laptop
- Small size, inexpensive, driver installed

ACN Program Stat&

(1 April 199)

April 27, 1999 *NHTSA Research& Development*

- **Engineering, Design, & Manufacturing Phases Completed**
- **Emergency Message Reception, Display, & Routing Operational**
- **Field Operational Test is Underway:**
  - **Equipment Installed: 677 ACN / 2,930 CET**
    - Days-in-the-Field: ACN: 218,000 CET: 1,782,000
  - **Data Collection: 8 ACN / 22 CET "Crash Events"**
    - "Incidents": ACN: 25 CET: 34
    - "Out-of-Area": ACN: 1 CET: 3
  - **Supplemental additional testing is being performed**

Summary: Representative ACN Crash

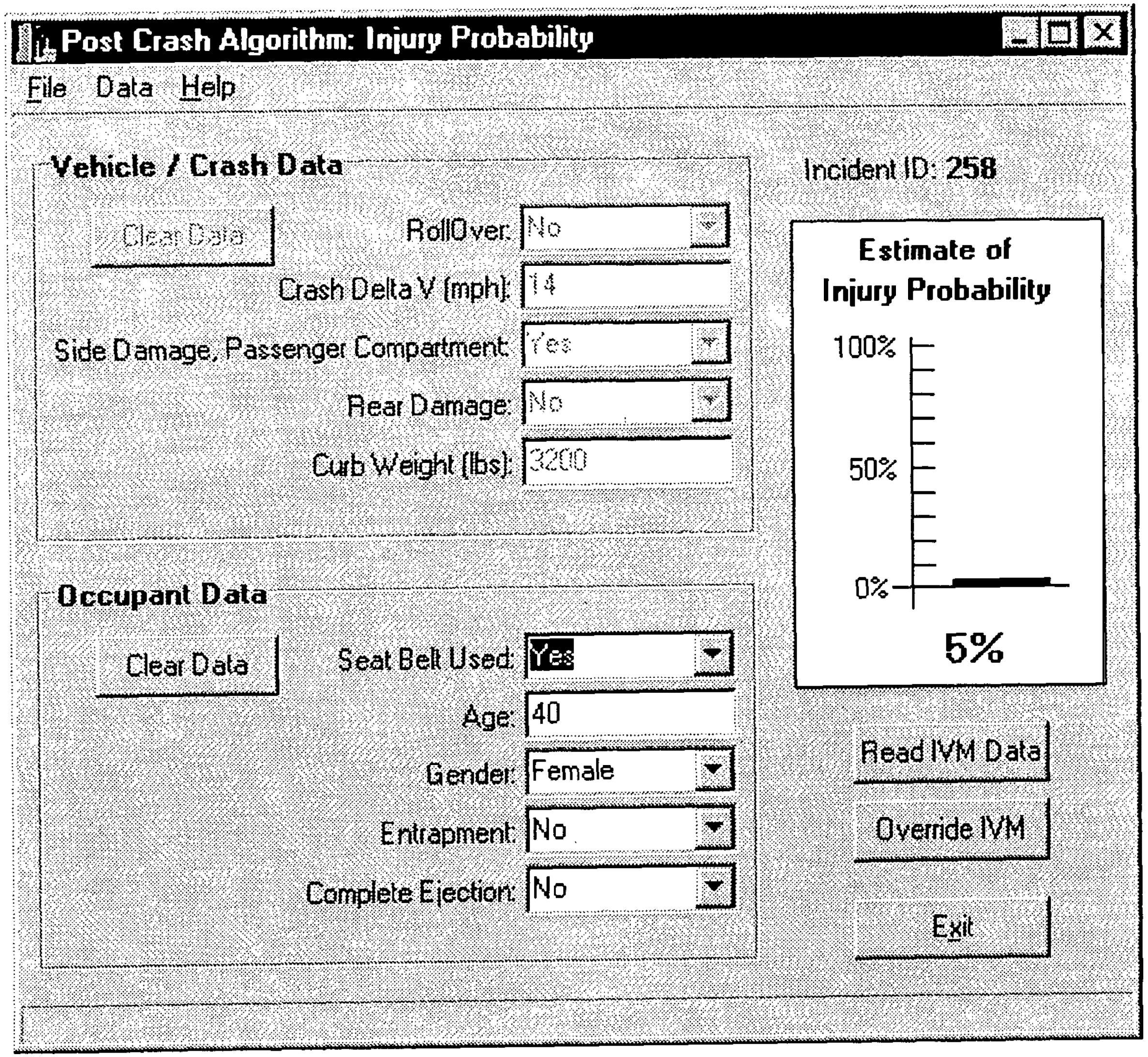
- **Crash occurred at a Four-Leg Urban Intersection in Buffalo on February 18, 1998 at 1:50pm**
- **Two vehicles were involved**
  - **1993 Ford Taurus**
    - ACN Equipped
    - Airbag Equipped but not deployed
    - Sustained damage to right side fender & right quarter panel
    - Single Passenger - Transported to Hospital (AIS 2)
  - **1998 Pontiac Sunfire**
    - Airbags deployed
    - Single Passenger - Injuries unknown at this time

ACN Crash Summary: Continued

- ACN reported crash message:
  - Crash Delta Velocity: 14 MPH
  - Principal Direction of Force: 2 O'clock
- Three Reports received by 9-1-l :
  - ACN (First)
  - 1 land line 9-l-l
  - 1 cell phone 9-l-l

Damage to Taurus

Injury ***Probability:*** *Es* ***tima tion*** *Algorithm*



What have we learned so far?

- **High level of interest in ACN systems:**
  - **EMS Service Providers (ER & Trauma Physicians), Law Enforcement, Driving Public, Major Vehicle Suppliers**
- **Automated Emergency Messaging Creates New Issues for EMS Dispatchers & Services Providers:**
  - **New Procedures & Protocols need to be Developed**
- **Identification of Legal & Institutional issues:**
  - **Ownership of ACN data**
  - **EMS procedures must be modified to accommodate ACN:**
- **ACN system design feasibility**

Status of ACN Systems

- Public-private partnerships have conducted operational tests addressing deployment issues
- First commercial systems have been introduced:
  - **GM OnStar, Ford Rescu, etc.**
- Additional architectural, deployment, **&** performance issues need to be addressed
- Interactions with the public safety dispatch infrastructure need to be defined
- System standards are under development

Relationship to National ITS Goals

April 27, 1999 — *NHTSA Research& Development*

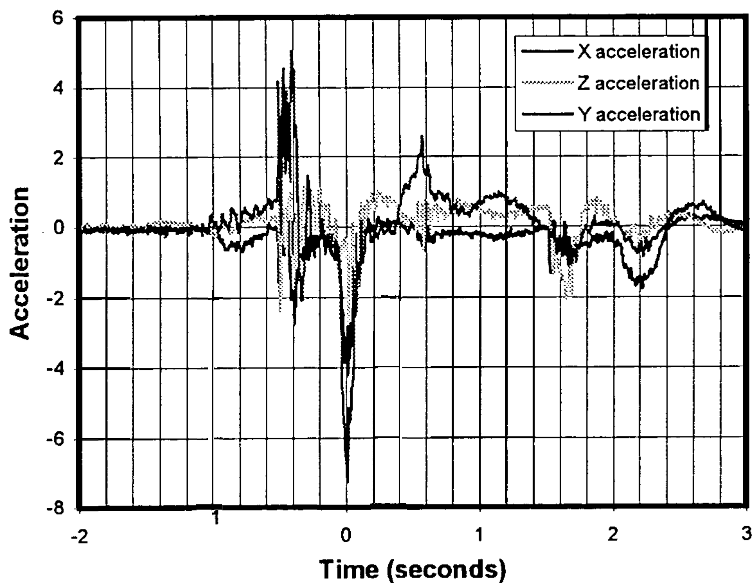
- **IMPROVE SAFETY**
- **Increase efficiency and capacity**
- **Reduce energy/environment cost**
- **Enhance productivity**
- **Enhance personal mobility**
- **Create an environment in which ITS can flourish**

Program Impact

- Model for developing & implementing capabilities
- Element of National ITS Architecture development
- Basis for standards development for ACN systems
- Accelerate deployment of a nationwide ACN

ACN Crash January 31, 1999

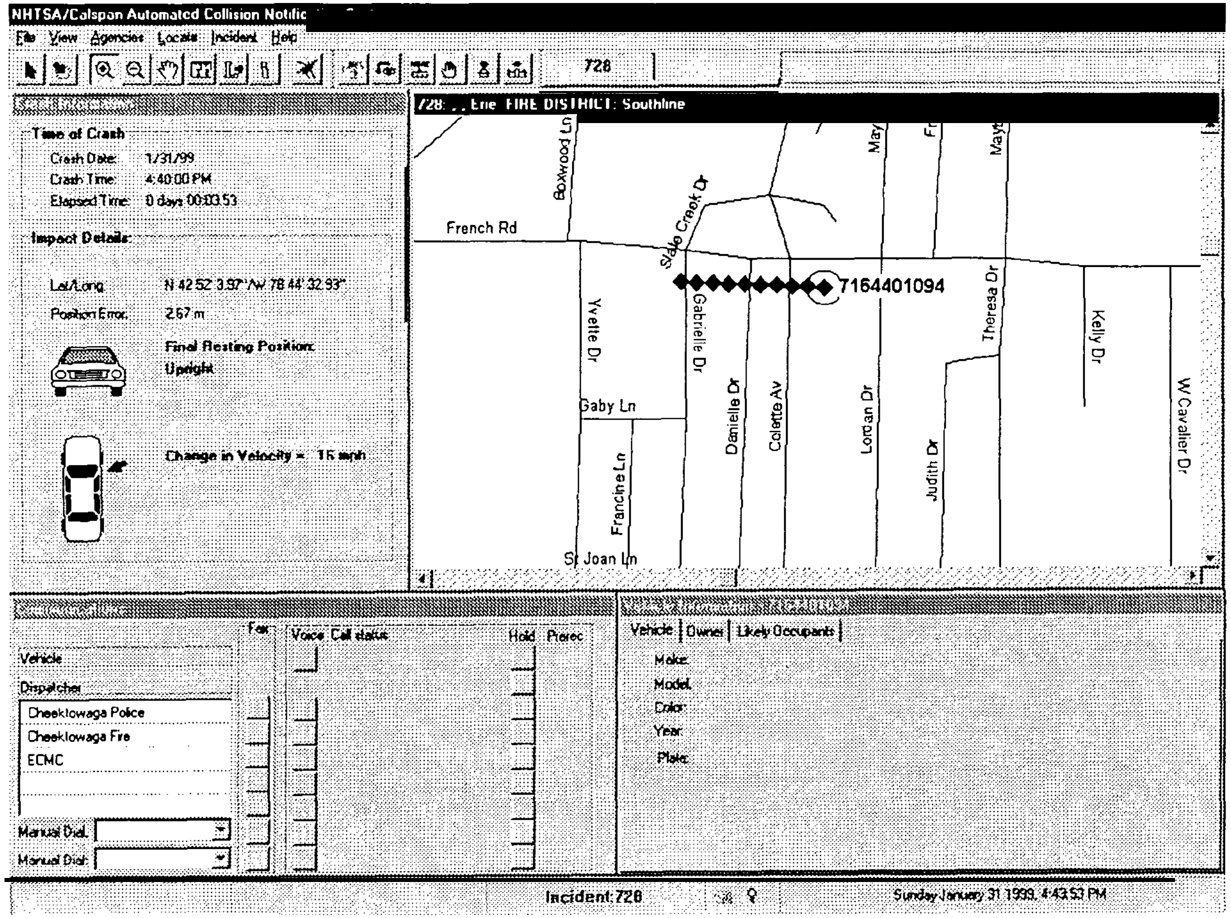
- Crash Time: 04:40 pm
- Notification Time: 04:41 pm
- Police Response Time: 04:45 pm
- EMS Response Time : 04:48 pm
- Delta Velocity (DV): 16 mph
- Principal Direction of Force: 2 o'clock
- Number Injured: 2
- Maximum AIS: 2



ACN Crash - Continued

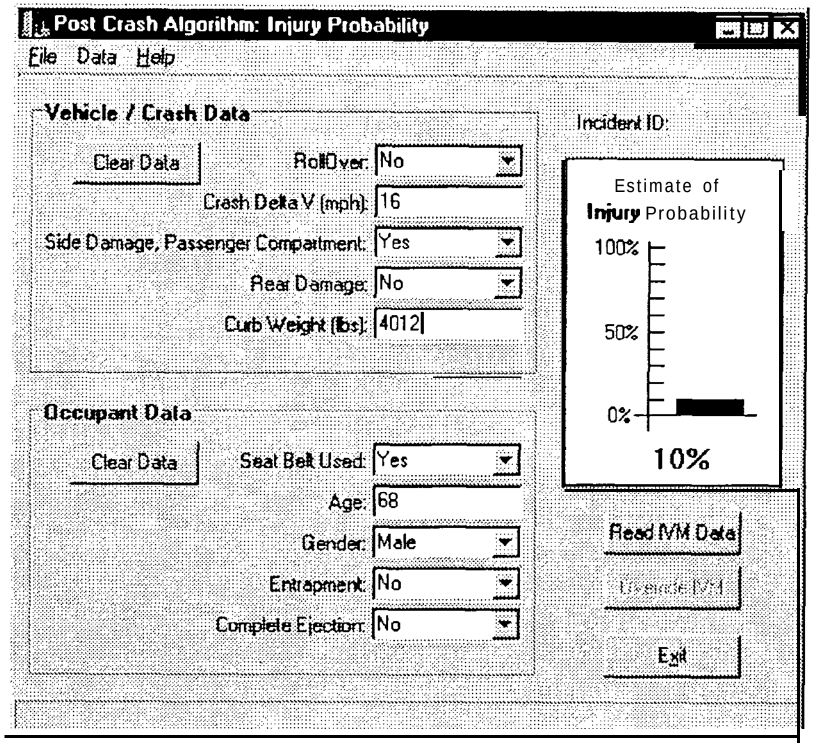
April 27, 1999 *NHTSA Research& Development*

ACN Dispatcher Interface



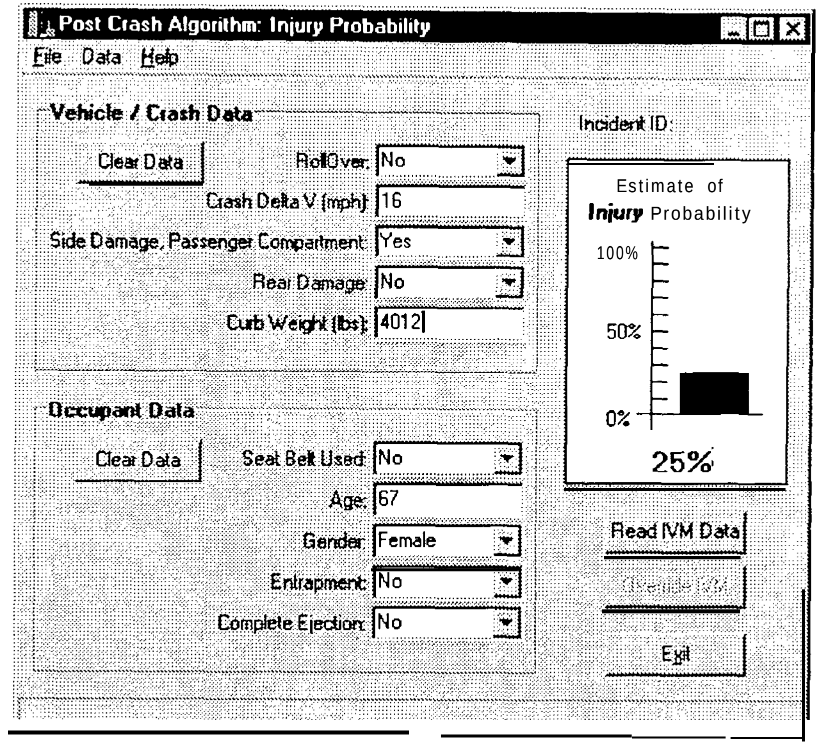
ACN *Crash - Continued*

Occupant #1



Actual Injury: Cervical Strain (AIS-1)
Transported and Released

Occupant #2



Actual Injury: Non-displaced compression fracture of the LI vertebral body (AIS-2)
Transported and Hospitalized (2 days)

Next Step?

- WIRELESS E-9-l-l
  - **Architecture and Standards**
    - Local / State / Regional / National
    - PSAP / Vehicle Capability / Equipment
    - Means of vehicle location:
      - example: GPS or triangulation
    - Means of communications
      - example: Cellular or satellite
  - **Stake holders (non-traditional roles / interactions)**
    - ComCARE Alliance, AAA, NENA, Emergency Medical, Public Safety, Consumer groups, Wireless companies
  - **FCC rule - federal legislation**

- Integrating Transportation, EMS, and 9-I-I :
  A Vision for the Future
- May **20, 21:** Alexandria, VA
- NENA, NHTSA, **ComCARE** Alliance, Wireless providers, CTIA, ITS America

Research Activity on Vehicle Recording System

Japan Drive Recorder Committee

Aim of Project

- True accident investigation

- Improvement of vehicle crash characteristic and crash tests regulations in Japan

Research activity

- Committee: research plan

↕

- Working Group: technical discussion

↕

- Experimental tests at JAR1

↑

funds:Ministry of Transportation

Members of the Committee

- Scholars (Professors of University of Tokyo, etc.)
- National Research Institute of Police Science
- Japan Automobile Manufactures Association
- Japan Auto-Parts Industries Association
- Ministry of Transportation

Secretariat: Japan Automobile Research Institute

The Committee

- Committee has just started last month (Feb. 1999)
- Research work will continue up to three years (1999,2000,2001)

Research plan in 1999

- Investigation in the world

↓

- Trial development of recoders

↓

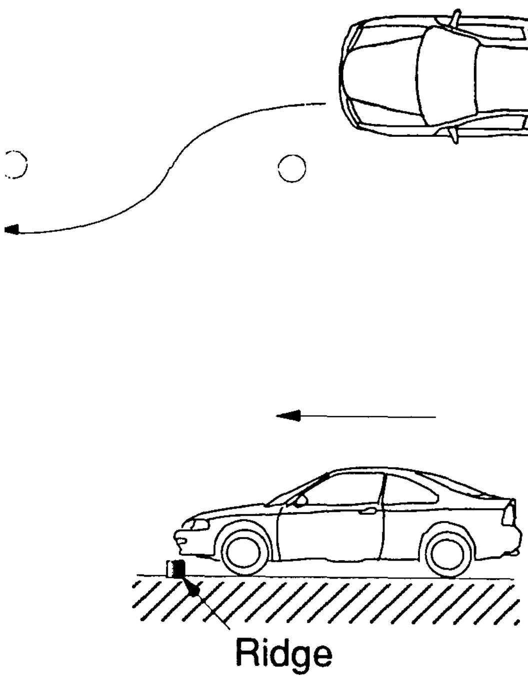
- Driving and crash experiments

↓

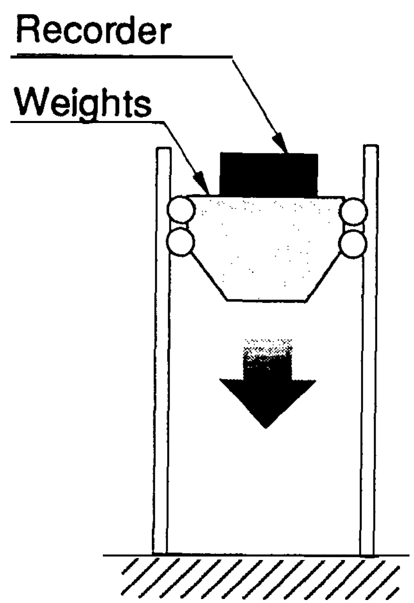
- Pilot run

Driving and Crash Experiments

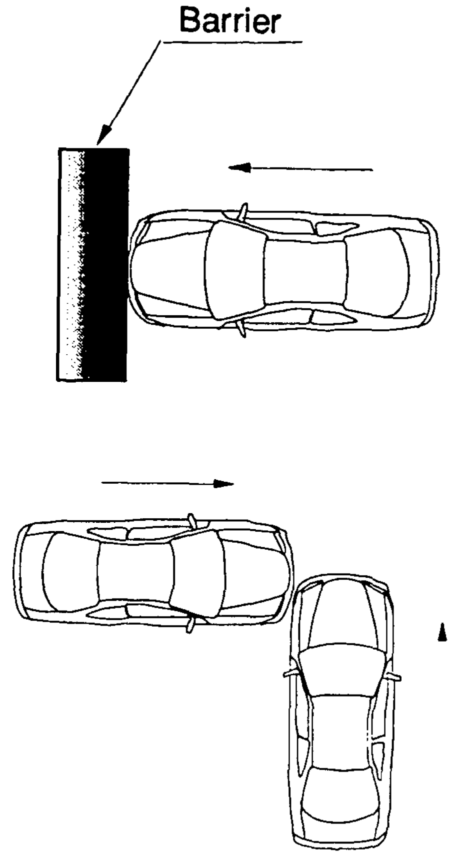
Drive tests



Fall test



Crash tests



Vehicle Recording System

- ADR(Accident Data Recorder)
- DMR(Driving Monitoring Recorder)

ADR system in Japan

- Japanese two makers try to make the ADR now,but those are not true ADR systems.

    1. Kobe Communication Engineering Company
    2. Data Tec Co., LTD

- Japanese makers combine ADR and DMR systems, and those are DMR system mainly.

DMR system in Japan

- Regulations: Ministry of Transportation
  (established in 1967)
- Apply: Heavy trucks (weights 8000 kg over)
  buses and Taxis
- Measure items: Travel speed, Mileage, Time (24 hours)
- Sampling requirements: 500ms, 2Hz
- Crash requirements: Max 120G, Time duration 30ms
- Types: Analog recording or Digital recording systems
- Makers: Over ten Japanese companies

Differences ADR and DMR systems

	ADR	DMR
Aim	Accident analysis	driving management drivers education
Sampling items	a lot of items	3(speed, mileage, time)
Acceleration	mesure	no mesure
Sampling rate	high(2ms)	low(500ms)
Recording time	low(45sec)	high(24 hour)
What is speed	travel speed impact speed reduced speed	travel speed

Japan Drive Recorder Committee

The Comparison of Vehicle Recording Systems

Recorder	A	B	C
ry	DMR + ADR	DMR + ADR	ADR
y	Japan	Japan	Germany
n	20 heavy trucks	300 light and heavy trucks	Berlin police 62, Laidlaw school buses etc
ng	20ms, 50Hz	100ms, 10Hz	2ms, 500Hz
ng duration	20 sec／accident (Max 5impacts)	30sec	before accident 30 sec, after accident15 sec (Max 3impacts)
ration(X)	±2G	±2G	±50G
ration(Y)	±2G	±2G	±50G
rement of angular rotatio	no mesure	gyro	magnetic sensor
of the vehicle	0～200km/h	Depend on speedometer	Depend on speedometer
l of time	year／month／day／hour／min／sec	year／month／day／hour／min／sec	year／month／day／hour／min
of GPS	no	latitude, longitude, speed, time	no
of steering	± 100%	no mesure	no mesure
of accelerator	o- 100%	no mesure	no mesure
ng	ON/OFF	no mesure	ON/OFF
reak conditon	ON/OFF	no mesure	no mesure(possible)
r conditon	ON/OFF	no mesure	no mesure(possible)
onditon	no mesure	no mesure	ON/OFF, High/Low
l light conditon	no mesure	no mesure	ON/OFF
y of driving monitor	raw data	actomatic dailv reootrt svstem	no
tion and analyzing of data	administrator can get data and use analyzing software	Data will be through branch to administration center. Then, administrator conduct analyzing by software.	send back to Germany
		Recorder can measure human pulse and electrical resistance of skin	Driver can erase own accident data

Yank out the plugs of auto snoopers and electronic leashes

WHEN ALLAN Pinkerton, President Abraham Lincoln's bumbling Secret Service chief, set up a private detective agency after the Civil War, he adopted as his logo an open eye and the slogan "We Never Sleep." That spawned the phrase "private eye."

Today the eyes have it. Privacy has fled. The latest intrusion is the "black box," the sensing and diagnostic module that GM has been secretly slipping into 6 million cars in the past decade.

You can call your new model a Cadillac or a Camaro, but what you're driving is the 1999 GM "Snitch." Next year you will have the chance to buy an SUV called the Ford "Big Brother," or the Volkswagen "Bugged Bug." Well-intended to research the causes of crashes and thereby improve auto safety, the hidden spying device records what you may have been doing wrong before a collision — which could have an impact on insurance or criminal liability.

I don't want a car that rats on me. Down that slippery slope of secret surveillance is a car that constantly records my speed, or sneakily tapes my private profanity at the guy who cuts in front of me, or reports me to the FCC for failure to install a cell phone. At the very least, I demand a commercial Miranda warning, as airline pilots have.

You can call your new model a Cadillac, but what you're driving is the 1999 GM 'Snitch.'

Secret surveillance is but one manifestation of a larger abomination: hypercommunication.

Detroit's lust for contact is matched by Wall Street, coming at it from the other end: The exchanges will soon make it possible for customers to make trades at any hour of the day or night. The brokers' motto is the Pinkertonian "We Never Sleep."

The round-the-clock trading — profit-taking pillow talk — will be explained as a necessary adjustment to international market efficiency, not to mention meeting the competitionof the Internet. All that investment for insomniacs time-zones me out.

Like the spy box in your car and the pager on your hip, all-securities-all-the-time is a manifestation of the headlong rush into the abyss of universal contact.

What's so hot about being totally reachable? Where is it written, Thou Shalt Never Be Out of Touch? Doesn't anybody long to be alone anymore? One of these days I'd like to turn on a TV set at an odd hour and see a test pattern. An entire TV generation has never experienced the peaceful patience of a test pattern. Or a message from station management saying simply, 'We're resting."

Hypercommunication is a throwback to the treadmill and we are its new oxen.

Too many of us, getting and spending, have bought the notion that solitary contemplation is anti-social. A century ago, when William Jennings Bryan made 16 campaign speeches in a day, an opponent asked, "When does he think?"

I was offered use of one of the first pagers. At the 1972 Moscow summit, President Richard Nixon wanted immediate access to his traveling staff. When I objected to this electronic leash, Bob Haldeman said privacy was no excuse, so I told him that the sudden beep at belt-level brought on a urinary urgency; he said, "Oh, you have a medical excuse," and I alone am escaped to tell thee.

The desperately in-touch deride as Luddite any reverence for working hours. They insist their own round-the-clock reachability is reversible: "We can always turn off the pager, or the cell phone on safari, or the all-night brokerage; we can disable the car bug." They delude themselves. Once hooked up, they are hooked forever.

Why? Because once a person sinks into an always-reachable state, all fellow-reachables resent any turning-off. Colleagues consider it aggressive rejection; global bosses call it malingering; spouses label it temporary desertion. When you are out of pocket, the world is out of sorts.

Thus conscience — that sense of letting down the always-on side — makes cowards of us all. If powering down does not make us feel impotent, it makes us feel guilty. And that *fin-de-milleniare* guilt at being even momentarily unplugged steals our supposed "right to turn off."

I say: Resist the 168-hour week. Buy unbugged cars and drive incommunicado. Trade during business hours. On vacation, vacate; on the Sabbath, sabb. Treasure those out-of-touch moments. Become a member of the Great Unreached.

WILLIAM SAFIRE is a *columnist for the New York Times. Write to him at the New York Times News Service, 229 W. 43rd St., New York, N.Y. 10036.*

WIRED NEWS updated 3:00 a.m. 4.Jun.99.PDT

GM Watches You Drive

by Lindsey Arent

12:30 p.m. 3.Jun.99.PDT

An in-car surveillance system presently running inside many General Motors vehicles is a significant erosion of personal privacy, critics and consumer advocates said Thursday.

"The biggest problem is that it appears that these devices were installed without the consumer's consent," said Barry Steinhardt, associate director of the American Civil Liberties Union.

"Clearly, the information will quickly get out of the control of the auto owner," Steinhardt said. "This may be as troublesome for what it portends for the future as what it can do now."

GM said its Sensing and Diagnostic Module (SDM) -- currently installed in hundreds of thousands of cars -- is only used for aggregate crash research, and poses no threat to consumer privacy.

Still, watchdogs are concerned that the latest SDM collects a little too much data for comfort.

The unit records and processes the last five seconds of vehicular data before a collision. The box determines the force of a collision, the speed at which the car was traveling, whether the brakes were applied, and how the airbag fared. The unit also tracks engine speed, the angle of the steering wheel, whether or not the seatbelt was worn, and the position of the accelerator pedal.

Presently, it is unclear exactly who will have access to the data collected and what the information will be used for.

The New York *Times* reported about the device -- and the value of the data culled -- on Saturday, but the device is nothing new.

Since 1974, GM cars equipped with airbags have collected crash data. The SDM is simply a superior version of those earlier diagnostic models, said Bob Lange, a GM engineering director.

"Our view is that the information recorded is the property of the vehicle owner, and we obviously won't collect data without an owner's permission," Lange said.

'When we collect [information] and use it for research data, no one will be able to identify a person or vehicle as being the source of an event. We will honor the privacy concerns that people might have."

With the help of a Santa Barbara firm, Vetronix, GM will develop software and a cable that will unlock the secrets of the box. For a few hundred dollars, consumers will be able to pull the SDM data into a laptop computer.

Steinhardt said that the data will inevitably end up in the hands of police. Further, it could end up being subpoenaed in a lawsuit.

Crash-analysis experts also questioned the box's reliability.

"An inexperienced person might not be able to interpret the data property," said James Stratton, senior crash investigator at the William Lehman Injury Research Center at the University of Miami.

Stratton said that some SDMs produce a series of figures, or a code that might be meaningless without the proper documentation and training. But, he added, the SDM data is far more reliable than that turned up through a typical crash reconstruction.

With humans, he said, "there's more room for error."

Despite the fears of privacy activists, safety industry experts say the box is a giant step forward in vehicle safety and accident investigation.

"Current methods are clearly not as accurate as we'd like them to be. This could ive us better information about how effective restraint systems are," said Adrian Lund, of the Insurance Institute 3or Hiahwav Safety, a crash research group funded by insurance agencies.

But regulatory questions linger as well.

"Can or should owners be given the option of having the black box installed in their motor vehicles?" asked Lawrence Friedman, chairman of the motor vehicle liability division of the Association of Trial Lawyers of America.

"Are we going to have a state or national law on the books that's going to require the manufacturer to install it, like in aircraft?"

University of California taw school professor Eugene Volokh said that data from the system would probably be admissible in court. 'A reliable program that gives reliable conversion of the data -- that's like bringing in the eyewitness," he said.

That's exactly what makes the unit so menacing, Steinhardt said.

"Its entirely likely that ... legislation will begin to require the installation of various tracking devices on the grounds that cars are a dangerous instrumentality," he said.

Sensing this apprehension, insurance companies aren't exactly gushing over the boxes.

"People may feel they have the right to privacy in their own vehicle," said Donald Griffin, spokesman for the National Association of Independent Insurers, which represents over 600 insurance carriers.

"[The SDM] could reduce fraud -- but it could also cause more lawsuits against insurance companies for using the information."

GM's Lange said he is not concerned that the box might turn consumers off, and that the company's research reveals that car buyers aren't particularly concerned.

But Steinhardt remains skeptical.

The loss of personal civil liberties always begins with the best intentions of our government."

Declan McCullugh contributed to this story.

Related Wired Links:

MS Patches Privacy Peephole
7.Mar.99

Valentines Safe from Prying Eyes
12.Feb.99

FAO Schwarz Springs a Leak
3.Feb.99

TV Site Reveals Personal Data
20.Jan.99

A Privacy Hole in My Excite
11.May.98

SportsLine Contestants Exposed
19.Dec.98

Have a comment on this article?
Send it.

[redacted]

>>> 44:Black Box for Automobiles

Hyundai Motor has successfully developed a black box for automobiles. The company plans to install the newly developed device on passenger cars and commercial vehicles (as an option) from 2003, said a company spokesman on May 18. The highly advanced device, developed with an investment of KRW200 million since 1997, has functions similar to those for airplanes. Kim Young-kil, an executive at the company's R&D center, said that the device would help to scientifically identify the reasons of auto accidents, thus easily settling disputes between those involved. The device memorizes outside shock, and how the driver operates the steering wheel, brakes and accelerator, among other driving conditions. Currently, Saab of Sweden is selling automobiles with a black box.

SUBJECTS: Korea: Business News;
SOURCE: Hankook Kyongje Shinmun, 5/19/99,14;Korea;Korean

NHTSA DAILY CLIPS
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http://www.nhtsa.dot.gov
Tuesday, June 1, 1999

SUNDAY, MAY 30, 1999
N Y TIMES

Secret Witness To Car Crashes In Black Boxes

As in Planes, Recorders Hold Pre-Impact Data

FRONT PAGE

By MATTHEW L. WALD

Northwest 54th Street in Miami was crowded at 4:30 P.M. on Feb. 7, 1997, and many people saw the three-car collision that killed Detective Robert Vargas. But none of them could help tbe police determine why he died.

The 29-year-old detective, responding in his unmarked car to a robbery call, had what looked to investigators like a relatively minor collision with a Chevy Blazer entering the intersection from his right His year-old Chevy Lumina skidded across the double yellow line into oncoming traffic and was struck head-on by a Mercury Marquis.

Calculating the force of the crash from the skid marks and wreckage, investigators determined that Detective Vargas's air bag could have saved his life.

Why it did not was explained by a witness who never "saw" the crash, but reported many of its details electronically.

A black box about the size of a videocassette under the Lumina's front seat recorded that the air bag had, in fact, deployed when the Blazer struck the first blow more violently than the human analysts suspected. The bag had deflated before the head-on collision, leaving Detective Vargas, who was not wearing a seat belt, unprotected.

The telltale recorder, known as a Sensing and Diagnostic Module or S.D.M., was one of six million quietly put into various models of General Motors cars since 1990.

A newly developed model being installed in hundreds of thousands of G.M. cars this year records not only the force of collisions and the air bag's performance, but also captures five seconds of data before impact. It can determine, for example, whether the driver applied the brakes in the fifth second, third second or last second. It also records the

Continued on Page 14

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Secret Witness to Car Crashes Is the Telltale Black Box

last five seconds of vehicle speed, engine speed, gas pedal position and whether the driver was wearing a seat belt.

Ford has equipped hundreds of thousands of cars with a similar system, and is developing a device to read the data. An industry committee is trying to develop standards for the recorders.

Specialists in car crashes say the devices could revolutionize some aspects of accident research.

The devices could also bring important changes in insurance settlements, crash litigation, automobile design, and even the medical treatment of crash survivors. At the same time, important issues are being raised about who should have access to the data.

"The data from the S.D.M., in future crash litigation, can be the equivalent of DNA in paternity suits and murder cases," said Edward M. Ricci, a lawyer who is currently suing G.M. in a case brought by the family of Jerome Brown, a former professional football player who was killed in his Corvette in a 1992 accident.

Mr. Ricci said the recorder in that car proved that the cause of the crash was the air bag deploying when the car hit a pothole; G.M. disagrees.

But few lawyers or other crash specialists know much about the recorders, whose existence is virtually unknown to the public.

The advanced model, which records the final five seconds of data, was first installed in 1998 Cadillacs sold to rental car companies, but it was done so quietly that even executives at Avis, which buys hundreds of such cars, were unaware of the recorders.

At National Car Rental, a spokeswoman said executives were broadly aware of the system but had never seen any data from a crash.

"I'm sure, potentially, it would be useful," said Veronica F. Valentino, a spokeswoman at National's headquarters in Minneapolis. "I would think it's additional evidence, and if it could be brought into court, would certainly provide an opportunity to look at more information that previously wasn't available."

In many states, rental car companies are responsible for damage done by the cars they own. They have paid millions of dollars in judgments that might have been avoided if crash box data showed the accident was not the renter's fault, some' experts say.

Insurance executives are interested, too. They could lead to better settlements as time goes on," said Donald L. Griffin, an executive at the National Association of Independent Insurers, a trade association that represents 620 insurance companies.

The data could quickly clarify who was at fault, he said, though the industry would have to have more experience with the boxes before deciding whether to rely on them.

Some medical researchers think the boxes could save lives. If ambulance crews could read them on the spot, they could determine whether a crash w&s severe enough to create a likelihood of head injuries, for example.

Some head injuries only become evident hours after the accident, said Dr. Jeffery S. Augenstein, a professor of surgery at the University of Miami who has been working with G.M. to develop the recorders. But the recorders could alert doctors to watch for brain swelling or other symptoms.

Dr. Augenstein, who also has appeared in court as an expert witness in crash cases, said the data would give a better picture of what had happened, but "it will still require interpretation."

"You won't just plug it into a compouter and say, 'You're at fault; you pay $10 million,' " he said.

G.M. has been circumspect about the boxes because it does not want them used in litigation; in fact, executives are concerned that car buyers could shy away from such cars if they thought the data could be used against them.

The automotive black boxes could be almost as useful as those on airplanes. The National Transportation Safety Board, best known for its plane crash investigations, recommended last year that they be used in cars. But compared with flight data recorders on planes, whose role is defined by Federal law, the automotive versions are hitting the roads in a legal vacuum.

"It is an untested area of law," said Lawrence B. Friedman, a personal injury lawyer in Boca Raton, Fla., and the chairman of the American Trial Lawyers Association's Motor Vehicle, Highway and Premises Liability section.

Massachusetts hopes to establish a pilot program later this year that would analyze data from the devices in G.M. cars involved in fatal crashes and compare the results with conclusions reached by human analysis, to help confirm the electronic recordings. But the state trooper planning the program, David M. Noonan, said that he did not know if he could ask a

Page

P2of4

A CLOSER LOOK

A Black Box for Cars

The Sensing and Diagnostic Module records data about a car crash when an air bag is deployed or almost deployed. The 1999 version installed by General Motors records the following:

- Whether the driver was wearing a seatbelt.
- Time between impacts in a multiple impact crash when the initial impact does not cause the air bag to deploy.
- Whether the passenger's air bag was enabled or disabled in cars with a cutoff switch.
- Engine speed, vehicle speed. brake status and throttle position during the last five seconds before impact.
- Whether light warning of an air bag malfunction was on or off.
- Length of time the air bag warning light was on.
- When during the crash the sensing system activated the air bag.
- If there were any engine or electrical malfunctions recorded by the car computer up to the time of the crash.
- Maximum change in vehicle velocity in crashes not severe enough to deploy the bag.
- How much the car decelerated and how quickly in a frontal crash.
- Time between the beginning of impact and the maximum change in velocity.

Source: National Highway Traffic Safety Administration

analyzing the data The company has been using the information mostly to refine its on-board safety systems, and wants the information from the newer boxes to show what a typical driver's behavior is in the seconds before a crash. When G.M. learns of a fatal crash involving one of its cars, it attempts to retrieve the recording device.

"Our interest is in safety research, and we're not going to encourage its use" in other forums, said Robert C. Lange, engineering director of auto safety at G.M. As for other uses, he said, "We are not going to be able to prevent that and control that"

Right now, only G.M. can download and decode data from its own boxes, but that will change within the next few months as software becomes commercially available. G.M. has an agreement with Vetronix of Santa Barbara, Calif., to develop software and a cable that will allow anyone with a laptop to interrogate the box. Vetronix also hopes to begin selling the software, including a proprietary circuit board that decodes the information, in August for a few hundred dollars, according to the company.

"Probably the owners of the vehicles will be the ones who will be ultimate arbiters as to whether such information is retrieved, and if retrieved, how it's utilized," Mr. Lange of G.M. said. But lawyers and others said this was an open question.

As a practical matter, G.M. has already found that if it does not let others, like the police, retrieve the data, it may not get much of the data. Once a car is sold, there is no way for G.M. to know whether that car becomes involved in a serious crash, so no way to know when to try and retrieve the box .

Some engineers wince at the coming legal battles. "Everyone probably is hesitant to open this Pandora's box," said Adrian Lund, a crash expert at the Insurance Institute for Highway Safety.

For the handful of researchers now using them in collaboration with *G.M.*, the data boxes promise a gold mine of information never before obtainable.

Highway safety experts say the information retrieved could change the way air bags and other safety systems are designed.

Air bags are currently made to meet the Government's 30-mile-per-hour. frontal-crash test standard, but data from real accidents could show that the accidents causing the most injuries are at a higher speed or a lower one, or are not head-on collisions. That might lead to new passenger protections.

The recorder is "an invaluable tool," said James E. Stratton, a senior crash investigator at the William Lehman Injury Research Center at the University of Miami School of Medicine, who helped reconstruct the crash that killed Detective Vargas.

The recorder is an almost accidental outgrowth-of the computerization of cars. Air bags already come with computers that measure the "crash pulse," or change in velocity, and calculate whether and when to deploy the bag.

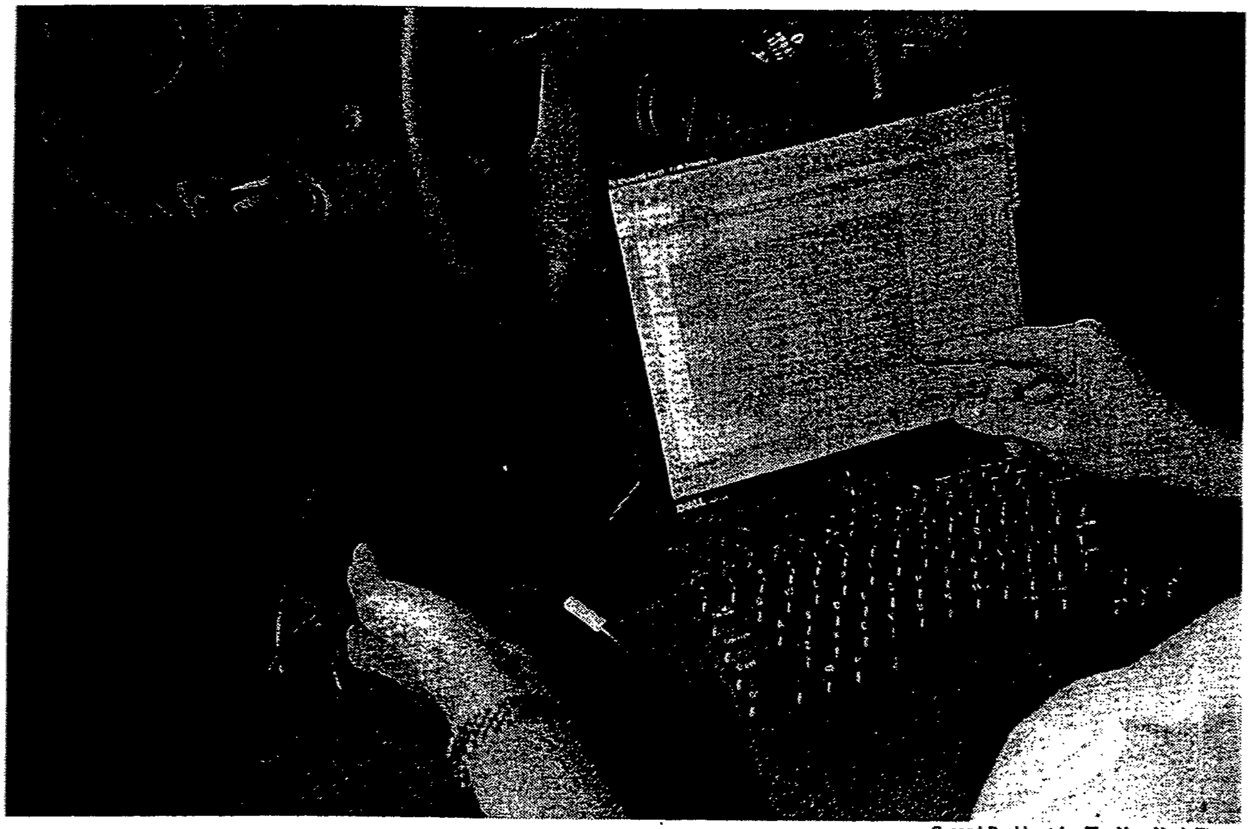
Many cars also have computers that keep track of engine speed, car speed, and the like. G.M.'s innovation Involved adding an inexpensive system that records all this data on a microchip if the car is bumped hard enough, or almost hard enough, to deploy the air bag.

The enhanced recorders are installed on all 1999 Buick Century Park Avenue and Regal models; the Cadillac Eldorado, DeVille and Seville models; the Chevrolet Camaro and Corvette, and the Pontiac Firebird. The company plans to have them on all its vehicles in the 2004 model year.

Trooper Noonan, of the Massachusetts State Police, said, "This has great implications for public safety and public health"

Sometime soon, said Trooper Noonan, in one of the 400 or so fatal crashes that occur in his state each year, two new cars will collide and researchers will have data from both of them, which could show tailgating, speeding, or other signs of bad driving.

Private use is more problematic. A driver charged with speeding or some other violation after a crash might seek to bring his own data to court, to exonerate himself, but Trooper Noonan said it has not been determined if such evidence would be admissible.



Gerard Burkhart for The New York Times

Vetronix of Santa Barbara, Calif., is developing software in conjunction with General Motors that would allow information collected by a car's "black box" to be downloaded onto a laptop computer after a serious accident.

NY TIMES, MONDAY MAY 31 OPED

Essay

WILLIAM SAFIRE

'We Never Sleep'

HARPERS FERRY, W. Va

When Allan Pinkerton, Lincoln's bumbling Secret Service chief, set up a private detective agency after the Civil War, he adopted as his logo an open eye and the slogan "We Never Sleep." That spawned the phrase "private eye."

Today the eyes have it Privacy has fled. The latest intrusion is the "black box," the Sensing and Diagnostic Module that G.M. has been secretly slipping into six million cars, in the past decade.

You can call your new model a Cadillac or a Camaro, but what you're driving is the 1999 G.M. "Snitch.'! Next year you will have the chance to buy an S.U.V. called the Ford "Big Brother," or the Volkswagen "Bugged Bug." Well-intended to research the causes of crashes.. and thereby improve auto safety, the hidden spying device records what you may have been doing wrong before a collision — which could have an impact on insurance or Criminal liability.

I don't want a car that rats on me. Down that slippery slopeof secret surveillance is a car that constantly records my speed, or sneakily tapes my private profanity at the guy who cuts in front of me, or reports me to the F.C.C. for failure to install a cell phone. At the very least, I demand a. commercial Miranda warning, as airline pilots have.

The world is too much with us.

Secret surveillance is but one manifestation of a larger abomination: hypercommunication. Detroit's lust for contact is matched by Wall Street, coming at it from the other end: the exchanges will soon make it possible for customers to make trades at any hour. of the day or night The brokers' motto is the Pinkertonian "We Never Sleep."

The round-the-clock trading — profit-taking pillow talk — will be. explained as a necessary adjustment to international market efficiency' not to mention meeting the competition of the Internet. All that investment for insomniacs time-zones me out.

Like the spy box in your car and the pager on your hip, all-securities-all-the-time is a manifestation of the headlong rush into the abyss of universal contact.

What's so hot about being totally reachable? Where is it written, Thou Shalt Never Be Out of Touch? Doesn't anybody long to be alone anymore? One of these days I'd like to turn on a TV set at an odd hour and see a test pattern. An entire TV generation has never experienced the peaceful patience of a test pattern. Or a message from station management saying simply, "We're resting."

Hypercommunication is a throwback to the treadmill and we are its new oxen. Too many of us, getting and spending, have bought the notion that solitary contemplation is antisocial. A century ago, when William Jennings Bryan made 16 campaign speeches in a day, an opponent asked, "When does he think?"

I was offered use of one of the first pagers. At the 1972 Moscow summit, President Nixon wanted immediate access to his traveling staff. When I objected to this electronic leash, Bob Haldeman said privacy was no excuse, so I told him that t&-sudden beep at belt-level brought on a urinary urgency; he said, "Oh, you have a medical excuse," and I alone am escaped to tell thee.

The desperately in-touch deride as Luddite any reverence for working hours. They insist their own round-the-clock reachability is reversible: "We can always turn off the pager, or the cell phone on safari, or the all-night brokerage; we can disable the car bug." They delude themselves. Once hooked up, they are hooked forever.

Why? Because once a person sinks into a permanently reachable state, all fellow-reachables resent any turning-off. Colleagues consider it aggressive rejection; global bosses call it malingering; spouses label it temporary desertion When you are out of pocket, the world is out of sorts.

Thus conscience — that sense of letting down the always-on side — makes cowards of us all. If powering down does not make us feel impotent, it makes us feel guilty. And that fin-de-milleniare guilt at beiig even momentarily unplugged steals our supposed "right to turn off."

I say: Resist the 168-hour week Buy unbugged cars and drive incommunicado. Trade during business hours. On vacation, vacate; on the Sabbath, sabb; on Memorial Day, remember. Treasure those out-of-touch moments. Become a member of the Great Unreacbed. ☐

LAW CATALOG ONLINE
THE NATIONAL LAW JOURNAL
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Black box car idea opens can of worms

Litigation advantages seen..But privacy issues are big worry.

BY BOB VAN VORIS

NATIONAL LAW JOURNAL STAFF REPORTER

The National Law Journal (p. A01)
Monday, June 14, 1999

The initial buzz that followed the news that General Motors Corp. is introducing "black box" technology into its cars centered on the improvements in safety and crash data that such technology will bring.

Some plaintiffs' and defense lawyers involved in auto crash litigation echo this positive message, saying that they look forward to more efficient, accurate resolution of car-crash liability cases. But others, concerned about how the devices' information will be used in court, fear that these black boxes may turn out to be Pandora's boxes.

"Will this be put to bad use?" asks Larry Pozner, the outgoing president of the National Association of Criminal Defense Lawyers. "Inevitably.

"It starts with We have something that will make life safer' and it ends with We have something to invade your privacy,' " says Mr. Pozner.

Existing technology, some of it developed for use in other modes of transportation, holds out the possibility of truly sophisticated monitoring and recording devices in cars, raising even more privacy issues. Coupled with the Global Positioning System, for example, cars could record exactly where they've been driven. Sensors in the steering wheel and brake pedal could easily be used to show that the driver was weaving or tailgating.

But although some criminal lawyers and privacy advocates are concerned that data collected by black boxes may be misused by law enforcement officers, lawyers involved in litigation resulting from crashes are more optimistic.

Since 1994, sensors in GM cars have captured information that indicates whether or not the driver's seat belt was latched at the time of a crash. This can be critical information in some cases, say lawyers. Seventeen states permit defendants in car

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USA TODAY 6/8/99

Automakers' trunk-release plans

Various automakers' plans to offer trunk-release retrofit kits for vehicles on the road, and for installation of trunk-release systems in new models **(Story, 1A)**:

	Retrofit kit	**Model-year cars**
BMW	Summer 2000	To be determined
DaimlerChrysler	Summer 1999	To be determined
Ford	To be determined	2000
General Motors	March 1999, $50 installed; 1990 and later models	Family vehicles by 2002
Honda	To be determined	NA
Hyundai	No plans	Since 1998
Mazda	Under consideration	2000
Mitsubishi	Beginning late 1999	2001
Nissan	Year end; for 1990s models	Dealer option later this year
Porsche	NA	To be determined
Saab	NA	2003; select vehicles
Subaru	Summer 2000; 1995-2000 model sedans	2001
Suzuki	Under consideration	Under consideration
Toyota	To be determined	2001; select models
Volkswagen	Under consideration	Under consideration
Volvo	Under consideration	Alternate plan; to be determined

Note: To be determined means the automaker will offer trunk latches but the date and model have not been decided. Source: Expert Panel on Trunk Entrapment, USA TODAY research crash cases to limit damages if they can show that the plaintiff failed to wear a seat belt, according to the Insurance Institute for Highway Safety.

"A lot of trials and a lot of courtroom time is related primarily to the question: Was the seat belt buckled, and did it stay buckled?" says Richard Bowman, of Minneapolis' Bowman & Brooke, GM's primary outside counsel.

Another question that is often critical is how severe the crash was, measured by the loss in velocity, or the "delta V." The rule of thumb is: The more severe the crash, the less the car can be expected to protect the occupants

"Boy, could we put some experts out of work if we give us delta V," says Mr. Bowman.

has back of page also

Mr. Bowman believes that the added certainty the ne benefit manufacturers, permitting them to defend case performed as intended and to settle cases in which the.

Even some plaintiffs' lawyers agree--at least to the exte help lawyers on both sides evaluate the strength of case of money are spent on discovery and on accident recon

"From a conservative plaintiffs' lawyer's perspective, I co better," says Terrence McCartney, of New York's Rhein P.C.

6 million equipped

All told, since 1990 GM has equipped some 6 million vehicles with the capability to record at least some crash data.

A system that has been installed in GM cars since 1994 records 11 categories of information, including the amount of deceleration, whether the driver was wearing a seat belt, whether the airbag was disabled, any system malfunctions recorded by the on-board computer at the time of the crash and when the airbag inflated. A more sophisticated system installed in some 1999 models also records velocity, brake status and throttle position for five seconds before impact.

Compared with flight data recorders in airplanes, black boxes in cars are fairly rudimentary. Airline black boxes record 150 separate categories of data and include recordings of cockpit conversations for 30 minutes before a crash says Lee Kreindler, a plaintiffs' lawyer and expert on aircraft disaster litigation.

Another important difference, says Mr. Kreindler, is that airline black boxes and crash investigations are heavily regulated by the federal government. In contrast, car manufacturers can determine the crash data their products will record. And, most important, there is no provision for investigative authorities to take control of car black box data.

Cars manufactured by Ford keep limited data on vehicle deceleration and airbag

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deployment beginning with the 3 999 models, according to a spokeswoman. Other manufacturers have installed systems to capture different crash data, but none as extensively as GM.

But although GM points to the safety improvements that it believes the additional data will help generate, the company has nut been eager to share the information with plaintiffs' lawyers.

"I have probably had a half-dozen cases with this system in it, and they never disclosed it," says Larry E. Coben, of Coben & Associates, in Scottsdale, Ariz. And while the information is in the plaintiffs' possession, he says, lawyers generally have to cooperate with GM to access the information without destroying it.

According to attorneys who have litigated against GM, only a few plaintiffs' lawyers were aware of the data that can be collected, and there are only a handful of outside experts to turn to.

One of them is Bill Rosenbluth, a forensic engineer who heads Virginia-based Automotive Systems Analysis. As recently as April, he made a presentation to a group of products liability plaintiffs' lawyers about the wealth of recorded data that can be extracted from a car after a crash. The lawyers, who belong to a plaintiffs' information exchange that focuses on auto cases, were generally surprised, he said.

Mr. Rosenbluth said the available data differs among manufacturers and from model to model, and the car makers don't go out of their way to make it easy fur car owners to retrieve the data.

"Many of the manufacturers don't want people like me knowing what's there,"' says Mr. Rosenbluth.

Mr. Bowman, GM's courtroom defender, says that the effect on litigation pales in comparison with the potential fur improvements in auto safety. "Nuts to its effect on litigation," he says.

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GM Installs 'BlackBox'onAutos

June 2, 1999

WASHINGTON - The Associated Press via NewsEdge Corporation : General Motors Corp. has a device in many of its new cars that functions like the black box recorder in airplanes: It collects data as a car crashes.

Doctors and government officials say that information can help them better understand how the human body tolerates car crashes. It could then be applied to construct safer cars, improve the treatment of crash victims and write government auto safety standards that would better protect crash victims.

The existence of the so-called auto black box system also is raising sensitive privacy questions about whether such information can be used in litigation.

The most sophisticated version of GM's device, known formally as a sensing and diagnostic module, is in hundreds of thousands of GM cars from the 1999 model year, GM says. It is part of the air bag sensing system on the 1999 Buick Century, Park Avenue and Regal, the Cadillac Eldorado, DeVille and Seville, the Chevrolet Camaro and Corvette and the Pontiac Firebird.

The module will be in almost all GM vehicles within the next few years, the company says.

The module stores information in the seconds before a car sensor identifies a crash and fires the air bags. The data includes the speed of the car, whether the driver was wearing a seat belt, when an air bag deployed and whether the driver used the brakes. It can also determine whether a warning light was illuminated on the dashboard telling an owner to service an air bag.

GM has quietly installed different versions of the sensing system on some cars throughout the 1990s, but the modules have become more sophisticated over time. Their existence became public in a paper written by GM and government engineers and presented at a conference last month.

Up until now, government crash investigators could only take an educated guess at the speed of a car involved in an accident based on evidence at the crash scene.

``Technology allowing vehicle safety researchers tu collect objective data would open the dour to a new generation of understanding," the paper said.

GM is currently the only automaker that makes such data and the tools to recover it available to researchers, the paper said.

Bob Lange, director of engineering safety fur GM, said he wanted tu use the information to better understand the injuries of people of all ages in crashes so that autos could be designed to ``reduce the likelihood of injuries."

GM has been using the technology on Indy race cars since 1992 and it has led to better crash protection fur drivers, Lange said.

``There's an incredible opportunity to improve safety," said Dr. Jeffrey Augenstein of the Crash Injury Research and Engineering Network. Augenstein said if doctors know more about crashes, they can target their treatment of patients, in some cases including checks fur serious injuries they might have missed.

John Hinch, a research engineer at the National Highway Traffic Safety Administration and one of the authors of the paper, said he saw ``lots of potential" in using the module's data. GM hopes to have laptops available so government crash investigators can download data independently of the company by the end of the year.

``If we can understand crashes better, we can have better sensors (in automobiles), better air bags," Hinch said. ``NHTSA can build better (safety) rules and have better information fur consumers."

Insurers also seem to favor so-called black boxes fur cars, in part because it would help them determine who is at fault in accidents. But they say courts will first have to sort through how such devices could be used in litigation and whether they are reliable if contradicted by eyewitness accounts.

Norman Jolly, an attorney who has litigated auto cases, said he has already seen auto companies try to use air bag deployment information stored on a car computer chip as a defense in lawsuits.

He believes companies will nut be able to keep such information private. `'They're going to know if your case has merit, and vice versa," Jolly said.

Ford Motor Co. said a more limited version of the module was on all its 1999 vehicles, but the company is unable to retrieve the data fur customers.

Justice for dangerous drivers?

There is growing public disquiet at what is perceived as a lenient approach to those guilty of causing death and injury on our roads. Poor and dangerous driving have been identified as primary causes of road accidents. TRL is carrying out research, on behalf of DETR, into the way in which bad driving offences are dealt with by the criminal justice system.

The offences relating to bad driving were reformulated in the 1991 Road Traffic Act, to more readily identify and punish dangerous drivers. The earlier offences of Reckless Driving were replaced by "Dangerous Driving" and "Causing Death by Dangerous Driving". These changes were intended to move the emphasis from the drivers' state of mind to the objective quality of the driving. According to the new legislation, a driver is guilty of Dangerous Driving if:

❐ the way he drives falls far below what would be expected of a competent and careful driver and

Cl it would be obvious to a competent and careful driver that driving in that way would be dangerous

This research is examining how the criteria defining these offences are applied in practice, and how bad driving offences are viewed by the agencies involved in the justice system. It examines the extent to which the consequences of bad driving (death or injury) play a part in the decision-making process. At present the

Cl Causing Death by Dangerous Driving – up to 10 years prison, unlimited fine, at least 2 years disqualification

❐ Dangerous Driving – up to 2 years prison, unlimited fine, at least 1 year disqualification

❐ Careless Driving – up to £2,500 fine, possible disqualification

There is no charge of Causing Death by Careless Drivin (except where alcohol or dru;gs are involved). This, togeth er with the much higher penalt for dangerous driving where death results, has caused son debate on how far the syste does (or should) focus on tl standard of the driving alon as opposed to the consequence Further argument centres whether the "deliberate" natu of some kinds of bad drivi should attract the high penalties, or whether t *potential* danger should be t key issue, regardless of t actual consequences.

The objective of the proj is to determine the effect of t 199 1 Road Traffic Act on t procedures that identify, conv and sentence those guilty of ve bad driving offences. T research seeks to ascertain ho the police view bad drivin what is leading prosecutors t select one offence rather tha another, and why courts choo one penalty rather than anothe By examining the whol procedure, from charging t sentencing, as well as carryin out an analysis of sentencin trends and reconviction rate before and after the 1991 A

will provide an understanding of how current legislation is being applied, whether there is sufficiently clear guidance on the law and its purpose, and how this affects the choice of penalty.

Part of the study involves "tracking" a number of individual cases, to see how the criteria for determining whether a particular piece of driving was dangerous or careless is applied. Several police forces in both England and Scotland are assisting in this research, as are the Crown Prosecution Service, the Crown Office, the Magistrates Association and a number of Crown Court Judges. By identifying how common features across a number of cases are dealt with, it is hoped to highlight the areas which require further clarification or guidelines. This exploration will seek to identify whether "lesser" charges of for example, careless driving are being brought where a charge of dangerous driving might be appropriate.

In 1996 5,800 people were convicted of Dangerous Driving and 57,400 of Careless Driving. In that year 3,598 people were killed on the roads. *In 382* of those cases someone was charged with Causing Death by Dangerous Driving, and 245 of those people convicted.

Contact: Lorna Pearce 0445
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Managing risk with "Black Box" technology

TRL's accident prevention and risk management work is not just limited to providing expert safety advice to those in the public sector. An increasing number of bodies approach TRL with concerns as to their corporate liabilities, increasing insurance and contingency costs, and the commercial worth of their safety strategies. Providing innovative analysis techniques and cost-effective research and consultancy is fundamental to TRL's mission.

One such sector is company car accidents. Many fleet operators have sufficiently largefleetsforrobuststatistical analyses to be undertaken . Installing a suitably tailored commercial vehicle accident database linking accident, personnel and vehicle operations is an approach that ensures that efforts and spending are targeted where the greatest and most cost effective accident reduction is possible.

Many companies consider that, with a high or increasing accident rate, their only option is to instigate driver training. Some firms feel that new technologies may help them - 'black box' journey and accident data recorders are now more widely available and inancially viable for a number

Journey data recorders can record detailed, extensive and objective information concerning vehicle status during complete journeys. Accident data recording devices trigger in the event of a crash, retaining crucial speed, deceleration, rotation and equipment status data for the seconds immediately before and after the impact.

In some instances, accident data recorder units have been linked to significant reductions in fleet accident rates. TRL is interested in the scale of this reduction, whether the effects are sustained and can be targeted at particular vehicles or drivers, and whether the driving behaviour and accident rate of private motorists would be similarly affected.

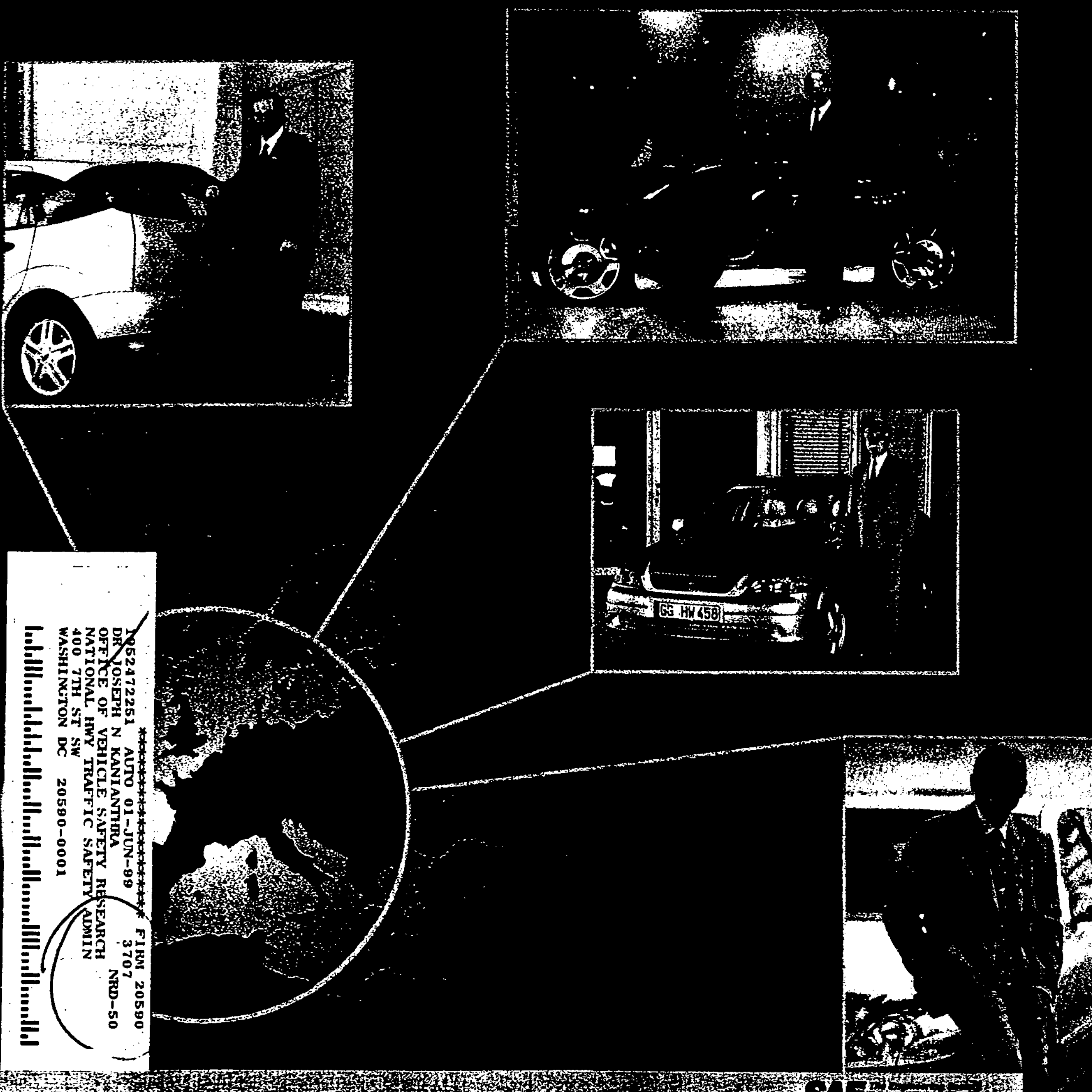
TRL has long experience in comparing new technologies and continues to study the human factors associated with the driving task particularly in respect of the various influences on safety. "We are in a unique position to independently appraise corporate fleet accident problems, recommend suitable safety measures and measure the subsequent effects," says Paul Forman.

Contact: Paul Forman 0890

JUNE 199… EUROPEAN GLOBAL VEHICLE DEVELOPMENT

automotive engineering

international



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SAE INTERNATIONAL

Indy racecar crash analysis

General Motors' Motorsports Safety Technology Research Program investigates Indianapolis-type racecar crashes using an on-board recorder.

The investigation of automobile crashes for the purpose of understanding the various factors involved in occupant injuries has allowed for the development of countermeasures for injury mitigation The methods of organizing and cataloging the variety of information collected from such investigations of highway crashes in the U.S. were formalized in the 1960s and 70s. During that time, computerization of the databases became viable and coding methods were developed to allow categorization of crash conditions, vehicle damage, and occupant injuries with codes that could be searched and retrieved by a computer. That capability greatly expanded the ability of researchers to analyze mass accident data statistically.

In 1991, during the planning of the GM Motorsports Safety Technology Research Program (MSTRP) it was concluded that there was a need for a similar methodology to enhance the collection of racecar crash data. The goal of the MSTRP is to improve the safety of both racecars and passenger cars through the application of crash protection research methods. The program is primarily focused on Indianapolis-type (Indy-type) racecar crash investigation. The study of these crashes has proven to provide an almost laboratory-like setting due to the similarity of the cars and relative simplicity of the crashes (predominantly planar crashes involving single car impacts against well-defined impact surfaces). There are many dissimilarities between crashes with passenger cars and those with racecars such as construction of the chassis, configuration of the cars, driver position and protection systems, driver demographics (almost exclusively. males less than 50 years old), and the fact that the cars always are traveling in the same direction. However, emphasis in the MSTRP has been on determining the crash forces acting on the driver by measuring the vehicle decelerations as near to the driver as possible. Thus the link from the racecar to the passenger car is the human occupant. An understanding of the crash forces and injury outcomes with the racecar driver can be of great value in future passenger car designs after sufficient work is done to transform the knowledge from the racecar to passenger Car setting. This transformation requires careful investigation and study to discem the basic principles that can be distilled from the information. Application of the knowledge to the passenger car **may not only** affect vehicle design, but also crash-test dummy design, injury criteria, and regulations.

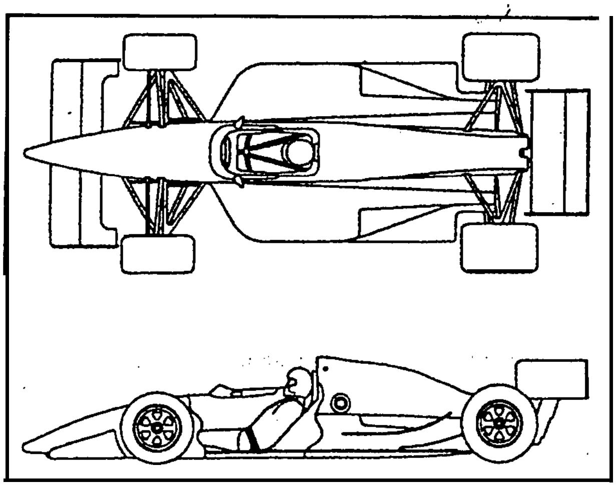

Figure 7. The Indy-type racecar is a single-seat, open-wheeled, open-cockpit, mid-engined vehicle with a carbon fiber/aluminum honeycomb composite chassis.

Table 1. Distribution of major deceleration impacts (202 cases).

Impact direction	Cases (%)
Front	3.1
Right-front	1.6
Right-side	37.0
Right-back	1.6
Back	12.4
Left-back	9.6
Left-side	34.0
Left-front	2.0

Investigation of highway crashes results in data that typically consist of a description of the accident scene and conditions at the time of the crash; estimates of the vehicle trajectories and speeds; a description of thenature of the impact and the exterior damage to the vehicle; a description of the damage to the interior of the vehicle, including possible occupant contact points; and detailed information about occupant injuries. Usually, these items are not determined at the scene, but rather a day or so after the crash.

Investigation of Indy-type racecar crashes allows for some significant differences in methodology in comparison to highway crashes. In contrast to the highway driver population, the Indy-type racecar driving population is well defined, being limited in any one season to about 50 drivers. Similarly, if a crash during a race occurs, its location is also well defined and limited to one of 20 or fewer tracks. The structural designs of all the Indy-type racecars are similar and controlled by the sanctioning bodies. There is often video coverage of the vehicle crash trajectory and vehicle impact attitude from various perspectives. Given the tight space for an Indy-type racecar driver and the mandatory and universal use of multipoint belt restraints, there are no questions concerning driver position and restraint use at the time of a crash. All of these factors present significant advantages in conducting an investigation, and in the accuracy and detail of data when compared to a highway crash investigation.

The Indy-type racecar that is the subject of this study is a singleseat, open-wheeled, open-cockpit, mid-engined car with a carbon fiber/aluminum honeycomb composite chassis known as a tub (Figure 1). The driver's compartment is a narrow, tightfitting tunnel with a form-fitting seat that is steeply reclined (up to 45" from vertical), positioning the driver's arms and legs horizontally. The required restraint system consists of double 75-mm (3-in.) wide shoulder belts connected to a 75-mm (3-m) wide lap belt and double rearward-facing 50-mm (2-m.) wide antisubmarining straps. A head restraint pad supported by the chassis structure behind the seat is also required. The sides of the cockpit are **high and** extend well above the shoulders of the driver, usually up to the sides of the head.

There are noteworthy structural features related to the crash performance of these cars in the front, side, and rear. The front of the car has a narrow tapered cone called a **nosecone.** It is required by the sanctioning bodies to pass an axial impact test for energy absorption and impact force control in frontal crashes. The sides of the car feature composite housings called sidepods, which contain the radiators for the engine cooling system and other auxiliary equipment. They are wide structures because they also house aerodynamic tunnels for the creation of downforce on the car. Although they are not required to pass a dynamic impact test like **the** nosecones, the sidepods serve as protective structures for **side im**pacts by providing a degree of energy absorption and force control. Because of the single-seat configuration, with the driver on the centerline of the car, the driver receives maximum benefit from the sidepods regardless of **which** side the car is impacted. In contrast to the front and sides of the Indy-type racecar, the rear structure consists of a mounted engine/gearbox, which, in the past, has not been designed for force control or energy absorption. The

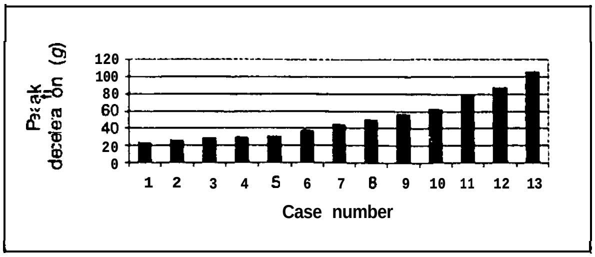

*Figure 2. **Frontal** impact peak decelerations.*

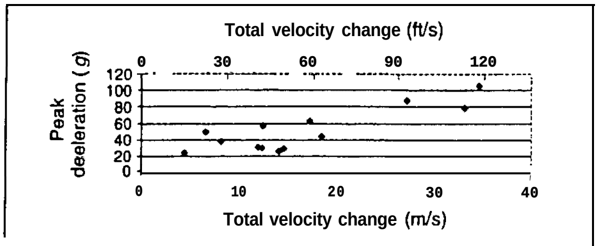

Figure 3. Frontal impact peak decelerations versus total crash velocity change.

composite chassis ends in front of the engine with a fuel tank between the rear of the cockpit and the engine. The engine and transmission are structural units and carry rear suspension loads to the chassis.

The anthropometry of Indy-type racecar drivers was documented by an MSTRP study in the early stages of the program. In general, the average driver is similar to the 50th percentile male of the general population. The age for a driver ranges from 25 to 50 years with an average of 34.

Many of the basic aspects of investigating racing car incidents (crashes) were already in place, in some form or another, with the sanctioning bodies for Indy-type racecar racing, the United States Auto Club (USAC), the Championship

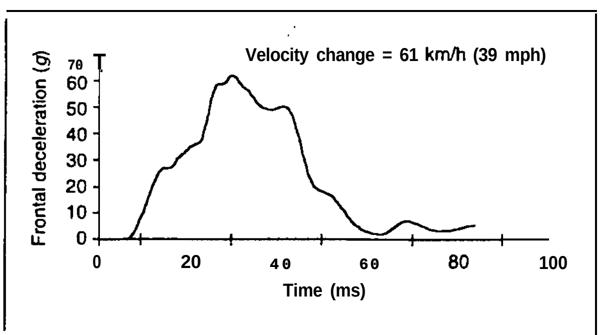

Figure 4. Severe frontal impact deceleration-time history.

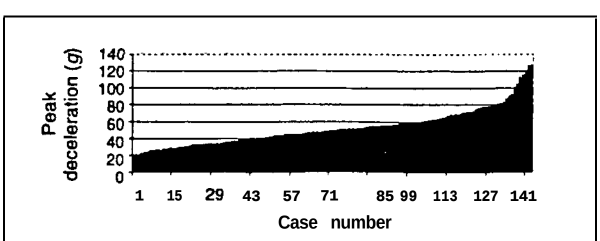

Figure 5. Side impact peak decelerations.

Automobile Racing Teams (CART) and, since 1996, the Indy Racing League (IRL). These include incident reports from track observers, photographs of crash damage to the vehicle, and injury information from the medical teams.

The package of data being gathered for the MSTRP consists of sections with general information, car deformation, crash description, driver information, driver injury, photographic coverage, and an overall summary. The general information section contains data on the race event, racecar type, track type and conditions, crash classification, and comments. The car deformation is indicated **on** a drawing of **an** open-wheeled racecar. The crash description has an overall drawing of the track and a place for a detailed sketch of the incident site. Information consists of the anthropometry and posture of the driver, restraint type, and initial post-crash status and treatment. The driver injury section contains detailed injury information as determined by a medical team. The photographic coverage section documents the existence and location of thevarious photographic records of the car, the incident site, car kinematics (video), and any other photographic records (such as still photographs of the impact by track-side photographers). The summary sheet 'contains subsets of the data in the other sections for quick review.

The most specialized revision of standard crash investigation coding methods involves vehicle damage. Highway crash investigation studies use the Collision Deformation Classification (CDC) method for this purpose. 'The CDC uses a seven character alphanumeric code to describe the crash force direction (using clock directions), general area of damage, specific horizontal or lateral area, specific vertical or lateral area, type of damage distribution, and a damage-extent code. The CDC method was taken and specialized for the Indy-type racecar case and driver injury coding was added to the investigation records., Both **the** Abbreviated Injury Scale (AIS) code used in highway crash investigation, and the ICD9CM discharge diagnosis code used by hospitals, were recorded for each driver injury.

The goal of the MSTRP database is to move from individual physical files, containing the information outlined above, to a completely computerized database with all the information stored in a form that can be easily searched by computer. That phase of the work is presently in progress.

The most unique feature of the MSTRP Crash Investigation Study is the use of an onboard crash recorder to measure vehicle chassis crash decelerations. Early in 1992, it was determined that an impact recorder was the only way to obtain accurate information on the deceleration-time histories and peak deceleration levels associated with an Indy-type racecar crash. The recorders were first installed in Indy-type racecars in May 1993, at the Indianapolis Motor Speedway, and were used in increasing numbers of cars throughout the remainder of the 1993 season. In 1994 and 1995, the recorders were installed in virtually every Indy-type racecar in every race of the season and, since 1996, have been in every IRL racecar. The preferred location for the recorders is mounted on the floor of the car, below the driver's knees. This puts the recorder as near the driver as possible while remaining accessible and easy to install. The recorder is attached with four bolts to provide a rigid coupling to the car chassis.

The chassis deceleration data from a crash is routinely filtered by a low-pass, 100-Hz, four-pole, Butterworth filter that is part of the IST EDR3 analysis package. This filter was chosen as one that corresponds to an SAE Channel Class 60 filter, which is commonly used to process vehicle chassis decelerations in automotive crash testing. This allows the rigid body motion of the chassis to be characterized and, by inference, the motion experienced by the highly restrained driver. It should be understood that this estimated whole-body deceleration is only a lower bound on the decelerations experienced by the body segments of the driver. Since there are no force-limiting belts or extensive crushable interior components restraining the driver, the actual decelerations will always be higher than the measured rigid body decelerations of the chassis due to less-than-perfect coupling of the driver to the car. To emphasize the biomechanical significance, only those crash recordings that had a peak deceleration greater than 20 *g* were analyzed.

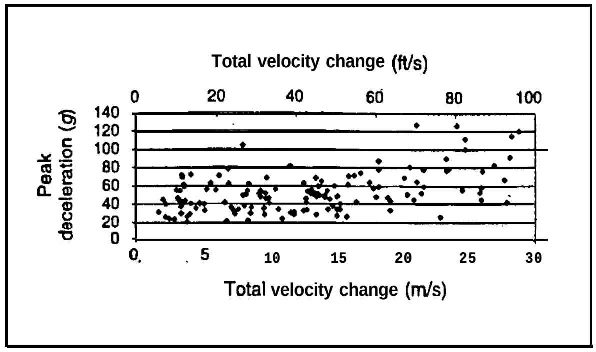

Figure 6. Side impact peak decelerations versus total crash velocity changes

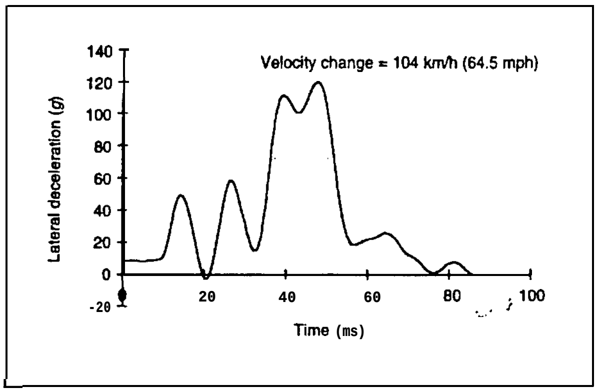

Figure 7. Severe side impact crash deceleration-time history

The direction of impact to the car depends on the attitude of the car at the instant of impact and the pre-impact motions of the car (especially rotations). As a result, the point of impact and the direction of impact can vary greatly. The impact directions, in terms of principal direction of deceleration for the 202 incidents, have been categorized (Table 1). The categories were designated as front, side, or back. The front category was defined as predominantly forward deceleration with significantly less or no lateral deceleration while the side category was defined as piedominantly lateral deceleration with significantly less or no forward deceleration. The back category was defined as predominantly rearward deceleration with significantly less or no lateral deceleration.

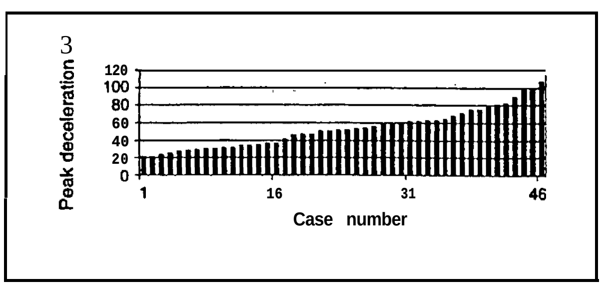

Figure 8. Rear impact peak decelerations.

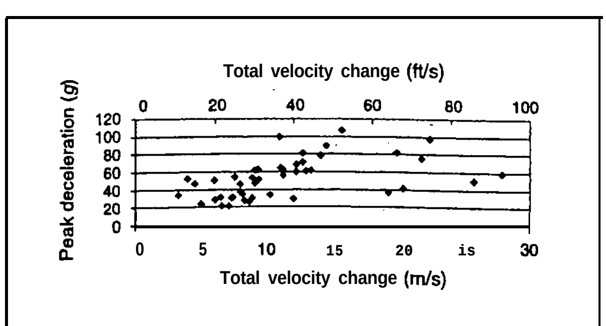

Figure 9. Rear impact peak decelerations versus total crash velocity change.

Over half the frontal crashes had peak decelerations above 40 *g* and the mean peak deceleration for the 13 cases was 50.7 g (Figure 2). Four of the cases (31%) had peak decelerations above 60 g and three of those four had total velocity changes greater than 24 m/s (80 ft/s) (Figure 3). Figure 4 shows the time-history of a severe frontal crash.

As shown in Figure 5,105 (73%) of the 143 total cases classified as side impacts had peak decelerations above 40 *g* with 41 cases (28%) above 60 *g* and 7 cases (5%) above 100 *g*. The mean peak deceleration was 53.3 *g*. The mean total velocity change for the side impacts was 12.6 m/s (41.4 ft/s) (Figure 6). Figure 7 shows the timehistory of a severe side impact.

As shown in Figure 8, 30 of the 46 cases (65%) had peak decelerations above 40 *g*, with 17 cases (37%) above 60 *g* and 6 cases (13%) above 80 *g*. The mean peak deceleration was 53.3 g, and the mean total velocity change was 11.6 m/s (37.9 ft/s) (Figure 9). Figure 10 shows the time-history of a severe rear impact.

The'data presented in this article represent a new source of information on the tolerance of the human body to whole-body deceleration. The combination of accurate recording of the chassis decelerations and relatively tight coupling of the driver torso to the chassis provides a unique opportunity to study the biomechanics of injury to a living human under high-severity crash conditions with time durations near the range of severe highway crashes. A typical 50 km/h (31 mph) frontal barrier crash of a passenger car has a duration of about 100 ms, while human volunteer sled tests are usually conducted at low deceleration levels and have much longer durations. The mean values of peak decelerations for all three directions of impact in this study were over 50 *g*. The highest recorded human volunteer sled exposures were 40-45 *g* peak decelerations reported by Stapp in 1970.

The extremely high deceleration levels recorded in this study provide significant insights into protection of the chest, particularly in side impacts. Specifically, it does not appear that chest-acceleration-based criteria for injury prediction, as currently required for injury assessment in federally regulated crash testing, have validity. The 60-g resultant spinal acceleration limit commonly used for frontal crash testing was obviously exceeded in many of these crashes. The chassis deceleration level exceeded this limit *in 62 (30.5%)* of, the cases in the study. Sled-testing simulations of frontal crashes, with the Indy-type racecar configuration of a reclined seating position and sixpoint restraints, produced peak Hybrid III dummy spinal resultant accelerations on the order of 1.5 times the peak chassis deceleration. Similar dynamic amplification factors would also occur in side and rear impacts. The sled tests showed that chest deflections with the double shoulder belts produced peak values below the commonly used limit of *50 mm (2 in.).*

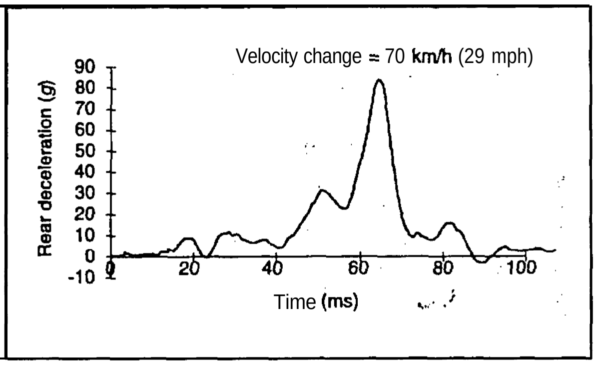

Figure 10. Severe rear impact deceleration-time history.

The side impact injury assessment criterion of TTI(d) (Thoracic Trauma Index) limited to 85-90 *g* for the average of the rib and spinal lateral peak accelerations would also seem to be exceeded in many of the side impact cases without chest injury. In fact, even without consideration of dynamic amplification, the chassis accelerations exceeded the 85-g limit in 11 cases without chest injury. The 130-*g* pelvic acceleration limit for side impact, on the other hand, may have been confirmed to some extent by the hairline pelvic fracture mentioned above for the case of 127-g peak deceleration.

The lack of internal organ damage in the chest for the side impacts is remarkable. Factors that may influence such successful outcomes include lack of intrusion; uniform support of the body from the feet to the head; thoracic containment by the tight, wide, double shoulder belts; and significant load paths around the chest through seat/chassis contact with the pelvis and shoulder. The combination of no direct intrusion into the chest, coupled with stable loading of the pelvis below the chest and the shoulder above the chest, means that chest deformations other than inertially induced deflections are minimized. The hairline fractures in the shoulder and pelvis of the 127-g side impact case are evidence of these load paths. The existence of a shoulder load path is made possible by the stabilizing influence of the shoulder belts. Additionally, the tight, wide, shoulder belts serve to constrain the fore/aft deflection of the chest due to side loading and may serve to keep the internal organs from moving excessively within the rib cage. Cadaver-based side-impact studies. would predict that aortic ruptures would have occurred in many of the side impacts in this study. While it is true that all of the drivers were physically fit athletes, they were not, in general,. extraordinarily, strong or conditioned to impact like football players.

Five and a half years of investigation of Indy-type racecar crashes have provided a number of insights into the dynamics of racing car crashes. What began as a pro gram to investigate racing car crashes to improve the safety of racing cars has had the additional benefit of providing new information on the tolerance of the human body to crash decelerations. The data on chassis deceleration call into question the use of thoracic spinal acceleration in injury assessment, particularly in side impacts. Subsequent study of these crash conditions using instrumented test dummies and mathematical models will pro vide even greater insight into the tolerance of the humanbody to impact loading as well as into ways to improve protection for both racing drivers and passenger car occupants.

Information was provided by John Melvin, Kenneth Baron, William Little, and Thomas Gideon of General Motors Corporation and John Pierce of Kestrel Advisors, Inc.

Interesting? Circle 9
Not interesting? Circle 10

EDR and Privacy Issues – Volkswagen's Position

Event Data Recorder

Event data recorders are devices proposed to be installed by automobile manufacturers into new motor vehicles prior to their delivery to dealers for resale to consumers. Such devices are proposed to record both accident related data objectively measuring the accident vehicle's performance as well as accident relevant data solely within the control of the driver or other occupants of the accident vehicle. Among the latter may be the speed at which the vehicle was operated at impact, whether or not seatbelts were worn by the driver or other occupants, the direction of the impact, turn signal operation, brake application, steering wheel position and other similar data indicating whether or not the driver caused or contributed to the accident. In some instances the data objectively measuring vehicle performance may also be used to affirm or rule out the possibility of a vehicle malfunction.

Use of the EDR Data

The data collected by EDRs may be used for multiple purposes, among them accident research preparatory to new motor vehicle safety regulations, improved accident performance of motor vehicles undertaken by the automobile companies, law enforcement and use of the data as evidence in litigation designed to assign liability to vehicle operators, automobile manufacturers or entities responsible for the construction and maintenance of highways.

Right to Privacy

Federal and in many instances state statutory law, with certain exceptions, prohibit the disclosure of any document to any person or another agency except with the written consent of the person to whom the record pertains. The purposes of these statutes are to protect the individual against infringing upon his or her rights to privacy as agencies embark upon data collections for multiple purposes. Certain private businesses are similarly regulated by federal and/or state law, i.e. the credit reporting industry.

The extent to which a vehicle owner has a right to privacy regarding EDR data depends in Volkswagen's view on whether or not the data identifies the individual person or event, or whether or not the individual person is deemed to have given his or her consent to the use of the data in the manner proposed.

Data Identifying the Individual

It is Volkswagen's position that irrespective of how any particular data relating to the accident is proposed to be used, if it permits identification of the individual person tied to the accident, that person should be advised of its proposed collection and use regardless of whether or not the law requires it. Volkswagen is committed to respect the privacy of its customers and it will not invade a realm of privacy, which is generously drawn, unless the vehicle owner or occupant has consented to that incursion of privacy. Volkswagen also recommends that the Working Group retain a law firm with constitutional expertise to conduct research in an attempt to identify the historical origins and the constitutional parameters of the right to privacy under state and federal constitutional law.

Data Not Identifying any Individual

The right of the individual person to be protected against unreasonable invasions of his or her private realm is implicated significantly less by data which is not individualized by the identity of the owner, driver or occupant. The collection or presentation of non-individualized data remains useful for the purpose of research preparatory to the development of new motor vehicle safety regulations and improved vehicle safety performance without raising the privacy concerns previously discussed. Nonetheless, even in this context, Volkswagen recommends that the purchaser of a vehicle equipped with an EDR device be fully informed of the nature of the data collection which is being undertaken, and the use which is made of the data. Furthermore, unless compelled by government regulation, Volkswagen would want to extend to the prospective purchaser the option of purchasing a vehicle with or without an EDR device.

Maintenance of the Integrity of the Data Collection Process and Program

Volkswagen believes that it is necessary to protect the integrity of the data collection process by addressing as early as possible issues of accuracy of the data, quality control, privacy concerns and use of the data in order to avoid creating the impression among vehicle owners that “big brother” in concert with the auto industry has the ability to aid law enforcement or influence private rights of action filed in a court of law. We therefore recommend that a data collection program be implemented in phases in order to allow the public to be educated about the laudable purposes of such a program. Volkswagen believes that the first phase should focus on the use of non-individualized data in conjunction with research supporting new or improved safety systems and regulations, research that the government conducts jointly with the industry. As the public becomes educated about the value of such research and as privacy concerns are discussed and subordinated to the laudable public purposes, data collection and use could be expanded into other areas.

The Issue of Ownership of the Data

The issue of ownership is closely intertwined with the issue of the scope of the rights to privacy that the constitution allocates to the individual in our society. Volkswagen recommends that we defer to the legal research which inevitably needs to be undertaken in preparation for addressing potentially explosive public concerns for privacy and the idea of “big brother” looking over each citizen’s shoulders when a motor vehicle accident occurs.

D.5 MEDICAL RELEASE STATEMENT

Ordinarily, the NASS contractor and the NHTSA make arrangements with local hospitals to obtain medical injury information without compromising hospital policy on data release. If hospital policy requires a patient release, the researcher will attempt to obtain a signed release from the patient. The release assures the patient that the medical information obtained will not be compromised by release of personal identifiers. An example of a medical release statement is given below:

> "I, ____________________ hereby authorize the release of the necessary medical information from my medical records at (name of Medical Institute1 to provide for the identification of the initial injuries sustained in the motor vehicle crash in which I was involved.
>
> This information is to be released only to authorized employees of (name of contractor1 who are conducting motor vehicle traffic crash research for the United States Department of Transportation, National Highway Traffic Safety Administration, under the National Accident Sampling System, Contract (DOT - Number).
>
> I understand that no names, addresses, telephone numbers, or any other means of identifying me with the motor vehicle crash or injury data will be associated with the hard copy case report. Medical reports will be maintained for no longer than thirty (30) days after the date of this release by the (name of contractor Before the National Highway Traffic Safety Administration (NHTSA) enters the hard copy case report into a public storage file, the medical report will be removed and may be used confidentially by the NHTSA as part of a clinical study of traffic crash injury consequences. At the end of three years, the report will be destroyed by the NHTSA storage facility clerk.
>
> ____________________ ____________"
>
> patient's signature date

Region I, One Congress Street, Suite 1100 (CAA), Boston, MA 02114–2023. Region I'S technical support documents are available for public inspection during normal business hours, by appointment at the Office of Ecosystem Protection, U.S. Environmental Protection Agency, Region I, One Congress Street, 11th floor, Boston, MA and Division of Air and Hazardous Materials, Department of Environmental Management, 291 Promenade Street, Providence, RI 02906-5767.

FOR FURTHER INFORMATION CONTACT: Ian D. Cohen, (617) 918-1655.

SUPPLEMENTARY INFORMATION: For additional information, see the direct final rule which is located in the Rules section of this Federal Register.

Authority: 42 U.S.C. 7401 et seq.

Dated: May 6, 1999.

John P. DeVillars,

Regional Administrator, Region I.

[FR Doc. 99–13029 Filed 6-1-99; 8:45 am]

BILLING CODE 6560–50–P

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 52

[MA–67–7202b; A–1–FRL–6346–7]

Approval and Promulgation of Air Quality Implementation Plans; Massachusetts and Rhode Island; Nitrogen Oxides Budget and Allowance Trading Program

AGENCY: Environmental Protection Agency (EPA).

ACTION: Proposed rule.

SUMMARY: The EPA is proposing to approve State Implementation Plan (SIP) revisions submitted by the States of Rhode Island (RI) and Massachusetts (MA). The revisions consists of adding a regulation entitled, "Nitrogen Oxides Allowance Program," and a consent agreement to the RI SIP and a regulation entitled, "NO_x Allowance Program," to the MA SIP. The consent agreement in Rhode Island establishes alternative NO_x reasonably available control technology (RACT) requirements for four boilers. The RI and MA regulations are part of a regional nitrogen oxides (NO_x) emissions cap and allowance trading program designed to reduce stationary source NO_x emissions during the ozone season in the Ozone Transport Region (OTR) of the northeastern United States. These SIP revisions were submitted pursuant to section 110 of the Clean Air Act (CAA).

In the Final Rules section of this Federal Register. EPA is approving the States' SIP submittals as direct final rules without prior proposal because the Agency views these as noncontroversial revisions and anticipates no adverse comments. A detailed rationale for the approval is set forth in the direct final rule. If no adverse comments are received in response to these actions, no further activity is contemplated in relation to this proposed rule. If EPA receives adverse comments, the direct final rule will be withdrawn and all public comments received will be addressed in a subsequent final rule based on this proposed rule. EPA will not institute a second comment period. Any parties interested in commenting on this action should do so at this time.

DATES: Written comments must be received on or before July 2, 1999.

ADDRESSES: Comments may be mailed to' Susan Studlien, Deputy Director, Office of Ecosystem Protection (mail code CAA), U.S. Environmental Protection Agency, Region I, One Congress Street, Suite 1100, Boston, MA 02114–2023. Copies of the State submittals and EPA's technical support documents are available for public inspection during normal business hours, by appointment at the Office of Ecosystem Protection, U.S. Environmental Protection Agency, Region I, One Congress Street, 11th floor, Boston, MA. at the Division of Air and Hazardous Materials, Rhode Island Department of Environmental Management, 291 Promenade Street, Providence, RI 02908–5767, and at the Massachusetts Division of Air Quality Control, Department of Environmental Protection, One Winter Street, 8th Floor, Boston, MA 02108.

FOR FURTHER INFORMATION CONTACT: Steven Rapp, (617) 918–1048 or at Rapp.Steve@EPAMAIL.EPA.GOV.

SUPPLEMENTARY INFORMATION: For additional information, se8 the direct final rule which is located in the Rules section of this Federal Register.

Dated: May 6, 1999.

John P. DeVillars,

Regional Administmtor, Region I.

[FR Doc. 99–13027 Filed 6–1–99; 8:45 am]

BILLING CODE 656040-U

DEPARTMENT OF TRANSPORTATION

National Highway Traffic Safety Administration

49 CFR Part 571

[Docket No. NHTSA–99–5737]

Federal Motor Vehicle Safety Standards

AGENCY: National Highway Traffic Safety Administration (NHTSA), DOT.

ACTION: Denial of petition for rulemaking.

SUMMARY: In this document, we deny a petition for rulemalcing submitted by Marie E. Birnbaum, a private individual. The petitioner asked us to initiate rulemaking to require passenger cars and light trucks to be equipped with "black boxes" (data recorders) analogous to those found on commercial airliners. We agree with the petitioner that the recording of crash data can provide information that is very valuable in understanding crashes, and which can be used in a variety of ways to improve motor vehicle safety. However, we are denying the petition because the motor vehicle industry is already voluntarily moving in the direction recommended by the petitioner. Further, we believe this area presents some issues that are, at least for the present time, best addressed in a non-regulatory context.

FOR FURTHER INFORMATION CONTACT:

For non-legal issues: Mr. Clarke Harper, Chief, Light Duty Vehicle Division, NPS–11, National Highway Traffic Safety Administration, 400 Seventh Street, SW, Washington, DC 20590. Telephone: (202) 366–2264. Fax: (202) 3664329.

For *legal issues:* J. Edward Glancy, Office of Chief Counsel, NCC–20, National Highway Traffic Safety Administration, 400 Seventh Street, SW, Washington, DC 20590. Telephone: (202) 3662992. Fax: (202) 366–3820.

SUPPLEMENTARY INFORMATION: We received a petition for rulemaking from Marie E. Bimbaum, a private individual, asking us to initiate rulemaking to require passenger cars and light trucks to be equipped with "black boxes" (data recorders) analogous to those found on commercial airliners, The petitioner stated that the purpose of the devices would be to record speed and possibly other data in order to (1) improve public safety by encouraging responsible driving, and (2) provide records of pre-crash speed and possibly other information. Ms. Birnbaum stated that this pre-crash information would work to improve driver accountability through better crash investigation, enforcement and adjudication.

We note that we received Ms. Birnbaum's petition just after we had denied another petition making essentially the same request. price T. Bingham, a private individual, had asked us to initiate rulemaking to require air bag sensors to be designed so that similar information is recorded during a crash and can be read by crash investigators.

In responding to Mr. Bingham's petition, we noted that the safety community in recent years has shown considerable interest in the concept of crash event recorders. Such recorders can, in conjunction with air bag and other sensors already provided on many vehicles, collect and record a variety of relevant crash data. These data include such things as vehicle speed, belt use, and crash pulse.

While we agreed with Mr. Bingham that the recording of crash data can provide information that is very valuable in -understanding crashes, and which can be used in a variety of ways to improve motor vehicle safety, we nonethless denied the petition. One reason for denying the petition was the fact that the motor vehicle industry is already voluntarily moving in the direction recommended by the petitioner. Another was our belief that this area presents some issues that are, at least for the present time, best addressed in a non-regulatory context.

We issued our denial of Mr. Bingham's petition on November 3, 1998, and published it in the November 9, 1998 edition of the Federal Register (63 FR 60270). Ms. Birnbaum's petition was dated November 7, 1998.

After reviewing Ms. Birnbaum's petition, we conclude that our reasons for denying Mr. Bingham's petition are also applicable to her petition. A full explanation of those reasons is provided in our November 9, 1998 Federal Register notice, which we incorporate by reference.

The November 1998 notice included a discussion of ongoing work in this area by NHTSA's Motor Vehicle Safety Research Advisory Committee (MVSRAC). The agency noted that MVSRAC had set up a working group on event data recorders under the Crashworthiness Subcommittee and that the first meeting of the working group had taken place in October 1996. Since publication of the November 1998 notice, another working group meeting has been held, and a third meeting is planned for this summer. The Event Data Recorder Working Group is considering a wide variety of subjects related to crash event recording devices and anticipates producing a report by the end of calendar year 2000.

Minutes of the Event Data Recorder Working Group meetings are being placed in the public docket. The public may access these materials via the Web. The Docket Management Web site is at "*http://dms.dot.gov*". You should search for Docket number 5218.

For the reasons discussed above, we are denying Ms. Birnbaum's petition for rulemaking.

Authority: 49 U.S.C. 30162; delegations of authority at 49 CFR 1.50 and 501.8.

Issued on: May 27, 1999.

L. Robert Shelton,

Associate Administrator for Safety Performance Standards.

[FR Doc. 99–13895 Filed 6-1-99: 8:45 am]

BILLING CODE 4910–59–P

DEPARTMENT OF TRANSPORTATION

National Highway Traffic Safety Administration

49 CFR Part 571

[Docket No. NHTSA–98–4422]

RIN 2127–AE22

Federal Motor Vehicle Safety Standards; Seat Belt Assembly Anchorages

AGENCY: National Highway Traffic Safety Administration (NHTSA), Department of Transportation.

ACTION: Withdrawal of proposed rulemaking.

SUMMARY: This notice withdraws a proposed rulemaking action to amend Federal motor vehicle safety standard No. 210 Seat Belt Assembly Anchorages. The proposed amendment would require that the lap belt angle for rear adjustable seats be measured in the rearmost adjustment position. However, the agency has determined that the proposed amendment may reduce vehicle safety and affect some front adjustable anchorage locations.

FOR FURTHER INFORMATION CONTACT: For technical information: Mr. John Lee, Office of Crashworthiness, NPS–11, Telephone (202) 366-2264. FAX number (202) 493-2739, Mr. Lee's e-mail address is: jlee@nhtsa.dot.gov.

For legal information: Mr. Otto Matheke, Office of Chief Counsel, NHTSA, (202) 366-5263 Fax number (202) 366–3820.

Both may be reached at: National Highway Traffic Safety Administration, 400 Seventh Street, SW, Washington, DC 20590.

SUPPLEMENTARY INFORMATION: Federal motor vehicle safety standard (Standard) No. 210 Seat Belt Assembly Anchorages specifies performance requirements for safety belt anchorages to ensure their proper location for effective occupant protection and to reduce the likelihood of the anchorages' failure in a crash. The requirements of the standard apply to passenger cars, trucks, buses and multipurpose passenger vehicles (MPVs). The standard sets zones within the vehicle where the anchorage must be located. The anchorage for a lap belt or the lap portion of a lap/shoulder belt is required to meet a minimum and maximum mounting angle. The standard also sets minimum strength requirements.

On December 4, 1991, NHTSA published a notice of proposed rulemaking (NPRM) to amend the lap belt angle measurement procedure for adjustable rear seats of Standard No. 210. The current procedure measures the angle from the seat aligned with the seating reference point. The proposed procedure measured the lap belt angle with the seat in the rearmost adjustable position. The intent of the amendment was to establish a more easily identified seat position for measuring the lap belt angle of the moveable rearward seats. The agency believed the seating reference point may not have been an adequate reference point for these rearward moveable seats.

The agency received five comments to the NPRM. All were opposed to the proposal as written. One commenter, Ford Motor Company (Ford), stated, "* * * the proposal may reduce vehicle safety, by requiring that anchorages be located in positions that produce a flatter lap belt angle than is ideal when the seat is adjusted to a forward adjustment position. Ford suggest that anchorages for rear adjustable seats be located from the hip point of the template when the seat is in the middle of its adjustment range." Ford also stated, "* . . an 16 month leadtime would be insufficient if anchorages were to be relocated as proposed."

Ford, Chrysler, Toyota and GM were concerned about the proposed wording of S4.3.1.1(b) in which "* . * a line 2.5 inches forward of and 0.375 inches above the seating reference point * * *" is replaced by "* . * a line from the seating reference point to the contact point of the belt with the anchorage * * *" would be a substantial rulemaking. The change could affect the dummy kinematics during Standard No. 208 testing as well as the anchorage location at front adjustable seats, not just the rear adjustable seats. Chrysler stated, "As

MVSRAC WORKING GROUP ON EVENT DATA RECORDERS
MEMBER LIST
July 13, 1999

Name	Company	Phone	Fax	Company Address	e-mail
David Bauch	Ford	313 322-3884	313 390-5144	Advanced Vehicle Tech #3, 2A149 Rm 2122, Mail Drop 3010, Ford Motor Company, Dearborn, MI 48121	dbauch@ford.com
Robert Cameron	VW	201 894-6245	201 894-5498	Volkswagen of America, 600 Sylvan Ave, Englewood Cliffs, NJ 07632	Robert.Cameron@vw.com
John Carney	Worcester	508 831-5222	508 831-5774	Worcester Polytech. Institute, 100 Institute Rd, Worcester, MA 01609-2280	jfc@wpi.edu
Charlie Gauthier	NASDPTS	703 734-1620	703 734-1868	1604 Longfellow St, McLean, VA 22101	
Alan German	Transport Canada	613 993-3609	613 991-5802	Road Safety and Motor Vehicle Regulation Directorate; Transport Canada; PO Box 8880; Ottawa Postal Terminal; Ottawa, Ontario, Canada K1G 3J2	GermanA@tc.gc.ca
Kathleen Gravino	DaimlerChrysler	248 576-3613	248 576-7918	CIMS 483-05-10; 800 Chrysler Drive, Auburn Hills, MI 48326-2757	kmg15@daimlerchrysler.com
Martin Hargrave	FHWA	202 493-3311	202 493-3417	FHWA, HSR-20, Turner Fairbanks Highway Research Center, 6300 Georgetown Pike, McLean, VA 22101-2296	martin.hargrave@fhwa.dot.gov
John Hinch	NHTSA-R&D	202 366-5195	202 366-5930	NHTSA, NRD-01, 400 7" St SW, Washington, DC 20590	john.hinch@nhtsa.dot.gov
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John Mackey	Loss Management Services, Inc.	516 226-7359	516 719-8882	36 Surf Road, Lindenhurst, NY 11757	Stlukech1@AOL.COM
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Brian Shaklik	Navistar	219 428-3205	219 428-3501	Navistar Technical and Engineering Center, 2911 Meyer Rd, Fort Wayne, IN 46801	Brian.Shaklik@Navistar.com
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EDR MEETING # 3; June 9, 1999; Washington DC		
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